Products finishing

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CONTENTS

Editorial 23

Correct Maintenance and Use of Manual Spray Equipment 24
By FRANK V. FAULHABER

Avoiding Unnecessary Solvent Losses..... 38
By JOHN E. HYLER

Conversion Calls for New Products and Methods 42

Preparing Iron and Steel for Bright Zinc Plating.. 46
By ARTHUR P. SCHULZE

Barrel Finishing of Metal Products, Part 5..... 62
By H. LEROY BEAVER

Finishing Clinic 74
By DR. ALLEN G. GRAY

News of the Industry..... 92

Finishes That Aid in Appearance and Utility....102

New Equipment and Materials.....104

The Finishing Touch 116

Opportunity Section 117

Catalog Library 118

Index to Advertisements.....120

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Products Finishing

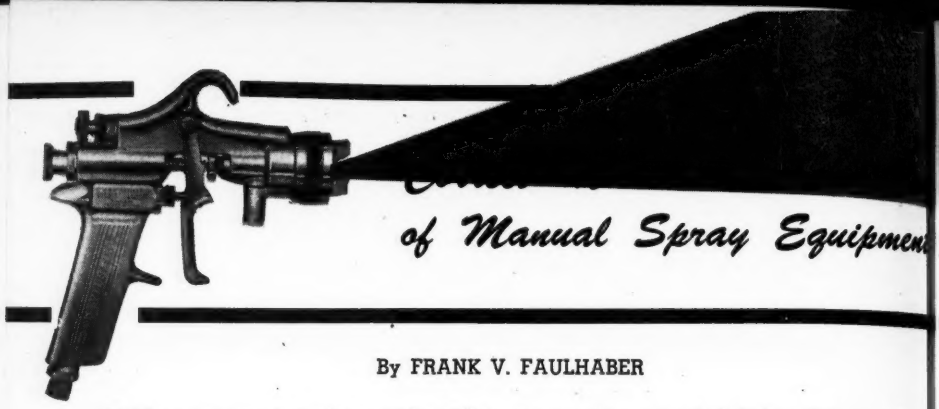
Practice Selection for Plated Coatings

Electroplated coatings are certain to be considered for many new applications at a time like this when the relative merits of various protective coatings and finishes are being pondered by engineers and production men planning the design of many new metal products. The element of *selection* should be carefully applied to make certain that the coating used is the one best suited for the job at the lowest cost and that it is applied in the proper thicknesses by the latest approved methods of plating. The selection of an electroplated finish is dependent on the requirements for the end use of the finished article, as well as the shop conditions available. In any case, the selection should be one in which all property characteristics pertinent to the use of the finished article are brought to the highest level of performance.

The *science* of electroplating has been developed. We find coatings today applied in layers with scientific precision. The thickness of each layer and the order of application have been carefully worked out to produce the best protection and beauty of coating, with the greatest economy in metal and cost of application. The scale on which coatings are applied in continuous processes and the speed of applying them have been increased through the help of the electrochemist working with the practical electroplater.

Exactly what the life expectancy of an electroplated coating will be cannot always be predicted because the conditions of exposure vary. However, to arrive at practical working standards, the American Society for Testing Materials, the American Electroplaters' Society and the National Bureau of Standards have jointly sponsored extensive outdoor exposure tests of electroplated coatings at a number of different locations chosen as representative of the types of exposure to be found in the United States.

These extensive cooperative test installations, which utilize actual service conditions under as close control as possible, are adding tremendously to the knowledge of the behavior of plated coatings under conditions close to those of daily service. One thing the finish engineer should make certain of is that full advantage is taken of all this available data in the *selection* of an electroplated coating to obtain the utmost in performance record for the finished product.



# of Manual Spray Equipment

By FRANK V. FAULHABER

IT can prove a serious and costly delay when the finishing plant must halt its production repeatedly by reason of inefficiently-operating spray-painting equipment. This is true whether the plant is large or small, for even minor interruptions can materially retard an establishment's output. Moreover, the problems become accentuated when the management finds itself confronted with many rush orders. It would be interesting to know how many orders have been cancelled, and customers completely lost, because the work could not be delivered in time—all of which so easily might have been avoided by a little timely and proper maintenance.

Appropriately applicable is the admonishment particularly with respect to manual spray-painting apparatus. Incorrect care and use and insufficient cleaning of spray guns, for instance, cannot only serve to impede an operator's work; his product, adversely affected as it will be, can hardly be expected to withstand rigid inspection. Grievous the aftermath, too, when a customer returns a consignment because the work was not sprayed properly.

In those plants where the operating personnel is constantly changing, these spraying perplexities and disappointments become even more pronounced. Even though the management has a vigorous maintenance program in force, the repeated labor turnover is bound to disrupt its plans. New, and especially inexperienced, employees create new problems. The farsighted management does well, so far as possible, to maintain intact its spraying department, even at higher cost. The endeavor to effect economies can, in the end, prove startlingly expensive.

Even the smallest finishing plants should have an ample supply of spray guns, suitable for the different types of work and for emergencies. There is the standard type production spray gun, which will also serve for touching-up and other light duty painting operations. However, the modern finishing plant will also have smaller touch-up spray guns, which will facilitate operations. If the volume of output normally is large, the management preferably will have an extra supply of duplicate guns so as to forestall every possible production delay that otherwise might arise.

Along this line, each operator should have a complete gun body as a spare as well as extra spray heads of adequate assortment so as to avoid the necessity of borrowing parts from other workers. The various air caps and fluid tips suitable for different paint materials should, of course, also be available for instant use so as to assure a better quality of workmanship, expeditiously executed, for all kinds of work.

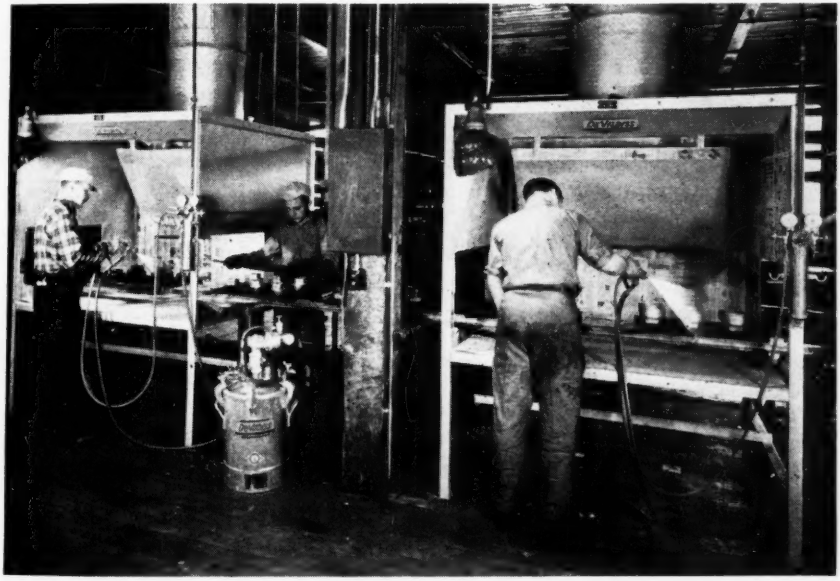
With the proper nozzle combination, the production type spray gun illustrated above may be used with a suction, pressure, or gravity material feed.

By reason of the diversity of present-day finishing materials and spraying conditions, the modern spray gun is so constructed that the spray head or working head of the gun is interchangeable. Only a moment is required to make the change from one spray head to another. The complete spray head comprises an air cap, fluid tip, fluid needle, and other vital nozzle parts.

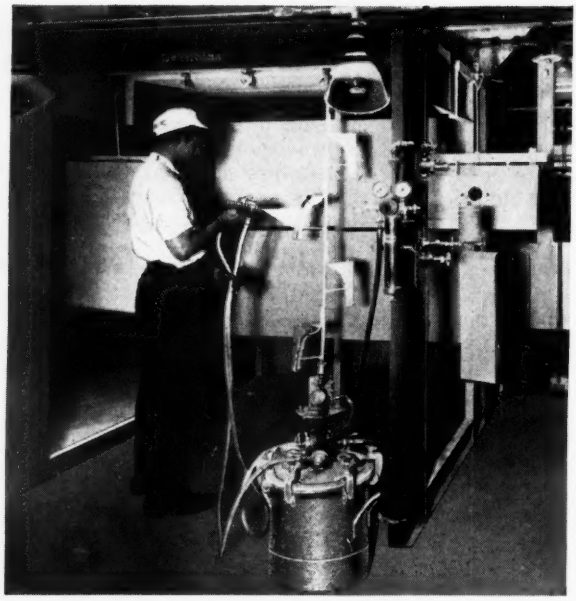
Each spray head is intended to accomplish the most indeficient results with each of the various types of material, material feed systems, and classes of work. In using suction feed, the spray operator will ordinarily require but two of these spray heads to turn out high quality finishes. Specifically, one is for use with lacquer, the other for use with synthetics. Plants using both of these materials should have both types of spray heads.

Some shops sometimes use a spray head, intended for spraying synthetic materials, on lacquer work; however, the workmanship is never of superb quality as it might be with the proper spray head. Importantly, lacquers are applied with an air cap that executes a pattern with a heavy center so that the fast-drying material will still be wet when it comes in contact with the surface. This is essential, since lacquers are virtually dry immediately after spraying and, when considerable air is used, may be nearly dry even before the spray is deposited on the finished surface.

Contrariwise, synthetic materials are slower-drying than lacquer. Consequently, it is desirable, when spraying synthetics, to initially apply a light coat—a little heavier than a mist coat. A short interval elapsing, a heavier coat should then be sprayed on. Vitally, higher air pressure and greater air volume are required to break up and



This illustration depicts a tidy, methodical arrangement for the spray lacquering of small articles.



The arrangement illustrated herein provides for the elimination of dust or dirt in the fine spraying of work.

efficaciously atomize the tougher synthetics than are essential for lacquer work.

Bear in mind, spray heads appropriate for use with lacquers will deposit too much synthetic material, with the worrisome sequence of runs and sags. Hence, air caps for use with synthetics pass a greater volume of air than those especially intended for lacquers. There is a sound logical reason for the two types of spray heads. Even when a finishing plant has an adequate supply of the proper spray heads, it should be a rigid policy for all operators to make the necessary changes instead of skipping this detail at the cost of superior work. Both spray heads are instantly interchangeable in the spray gun body.

When using a suction feed cup, the spray operator should fill the cup with the material to be used and then attach to the spray gun. Next, connect one end of the air hose to one of the air cocks on the left side of the air transformer and the other end to the air inlet nipple on the spray gun. Be sure to regulate the air transformer to the approximate required atomizing air pressure.

Paramountly, each type of finishing material will have its particular air pressure requirement for best atomization and width of spray. Begin with a pressure of between 50 and 60 pounds. Start spraying a pattern on some flat surface to determine a sample of the atomization produced at that pressure. Whenever this sample reveals large dots in the overspray, it is an indication of insufficient atomization. An increase in air pressure is necessary.

When the atomization is shown to be excessive, the operator should reduce the pressure until the smallest possible dots in the overspray result. When undertaking such atomization tests, adjust the spray gun for fluid flow and spray width. These two adjustments are made at the rear of the gun. To increase the fluid flow, turn the fluid adjusting screw to the left; to decrease, turn this screw to the right. The width of spray is controlled by the dialed spreader adjustment valve just above the fluid adjusting screw.

Turn this valve to the right when desiring to decrease the width of the spray; to the left, to increase. Through the use of this valve, variation of spray

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pattern from round to extremely wide is possible. So that the various spray patterns can be recorded and returned to at will, the face of this valve is graduated and marked. Whenever this valve is set for a spray that is too wide for the material being used a split spray will result. This is a spray pattern with a thin center and heavy ends. When this happens, the operator should reduce the spray width until the spray pattern is of uniform density.

Particularly the new spray operator should be enjoined that the start be made with the spreader adjustment valve setting at between 4 and 6. From this point the setting bringing out the most desirable spray can be attained. In operation, the spray gun should always be held perpendicular and 6 to 10 inches from the surface at all points of the stroke. Noteworthily, the stroke should be only as wide as can be conveniently reached by the operator. Of cardinal importance in achieving the most efficient effects is trigger manipulation. Essentially, this may be considered as starting the stroke, pulling the trigger, releasing the trigger, and following through with the stroke.

Notably, such technique prevents the application of excessive material at the beginning and end of the stroke and actually feathers the ends of the stroke for the succeeding overlap.

Ordinarily, a suction feed cup, simple in operation as it is, requires little attention. However, it should be the plant's inflexible rule that the cups being used should be cleaned thoroughly **immediately** after a given job is done. Simply flush out a cup with solvent appropriate for the material that was used, wiping with a cloth until clean. Be sure that the air vent hole in the lid of the cup is clean and free of accumulation. Neglect and remissness here will cause residue

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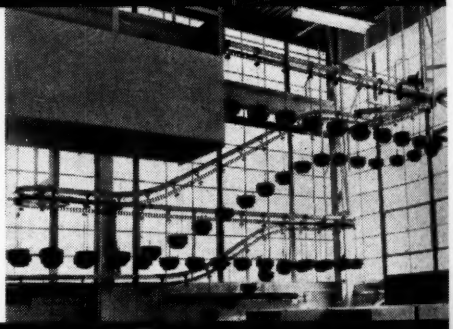

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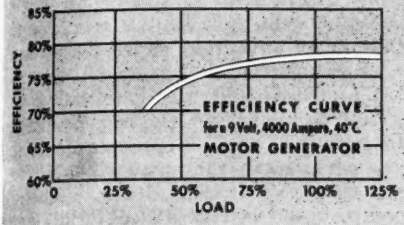

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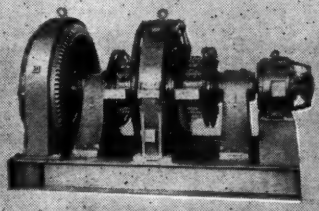

Every part of an E.P. Motor-Generator is readily reached for inspection and maintenance particularly important with relation to the bottom brushes. E.P. equipment requires no special protective equipment. Thirty-four years of operating experience prove that these Motor-Generators function safely under the extreme conditions common to most electrolytic operations.

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materials to harden and impair succeeding operations with the cup. Bear in mind, a clogged vent will induce a jerky or fluttering spray, eventually even preventing material flow to the spray gun. Also, dirty, loose or worn threads on the coupling nut and a loose or cracked tube will likewise cause a jerky spray.

Of the manual spraying equipment, a suction feed type gun is one having an air cap which is intended to create a vacuum, the fluid tip protruding above the air cap, thereby drawing the material from the container. This type of gun is usually limited to quart size containers or smaller. A pressure feed type gun has an air cap not necessarily constructed to create a vacuum, the fluid tip being flush with the air cap. With this type of gun, the air pressure is required to force the material from the container to the gun. A gravity feed type spray gun is one that can be fed from an overhead container by force of gravity. For this the air cap should be of the suction feed type. There are other types of spray guns, each intended for specific purposes, such as bleeder, non-bleeder, external mix, and internal mix.

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It cannot be overemphasized that more finish work is spoiled by dirty spray equipment or a dirty spray room than from any other cause. Need the management puzzle why so much marred and damaged work crops up? It should be unvarying, rigorous practice to maintain clean all spray equipment and particularly the spray guns. Never put aside a spray gun until it has been completely freed of all material last used with it. After a suction cup has been cleaned, pour a small amount of thinner into the cup. Then, attach the spray gun, shake the cup vigorously, and spray the thinner. This cleans the fluid passage in the spray head, the only internal part of the gun that is touched by the material. To clean the exterior of the gun, wipe clean with a cloth moistened with thinner and then blow out all parts with a duster or blow gun.

It should be a set part of the shop's schedule to lubricate all moving parts of a spray gun immediately after cleaning. Place a few drops of light oil on the air valve stem and fluid needle daily. Keep all packings (fluid needle, and so on) soft and pliant by occasional oiling. Coat the fluid needle spring with vaseline or light grease.

After removing a cup from a gun, hold a cloth over the openings in the air cap and pull the gun trigger. Air diverted into the fluid passage ways thus forces material back into the container. When using pressure feed, back up the regulator adjusting screw, release the pressure from the tank by means of the relief valve or safety valve, hold a cloth over the air cap, and pull the gun trigger so as to force the material back into the tank. Next, remove the fluid hose from the gun

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and attach to a hose cleaner, running solvent through the hose. The hose should be dried out with air. Then spray some solvent through the gun and clean the air cap and fluid tip. The tank also should be carefully cleaned out and reassembled for the next job.

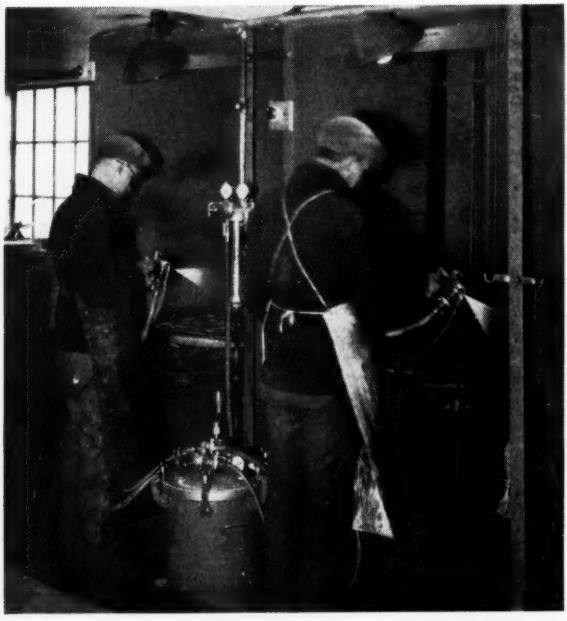
Many operators use strong solvents for the quick cleaning of spray guns with the result that vital lubricants are removed and the packings dry out. Caustic solutions, such as alkaline preparations, should never be used for cleaning spray guns. These destroy aluminum alloys used in the gun bodies and parts. A gun should never be left immersed in a solvent. It should be the plant's policy never to permit a gun to become so dirty that soaking of the complete gun is necessary. The dirtier a gun is allowed to get, the harder it will be to clean.

It is not necessary to take the spray gun apart to clean it. Simply spray clean solvent through the gun and wash off the outside with clean solvent. Keep the packing nuts around the fluid needle and air valve stem tight. However, do not tighten so securely that the parts cannot move freely.

Spray gun parts, in fact, should not be removed unless absolutely necessary. Be sure, when replacing the air cap assembly, that the air valve spring is correctly inserted in the recess provided in the gun body. Examine the condition of the gaskets when removing parts which seal on gaskets. Tighten the fluid tip securely when replacing.

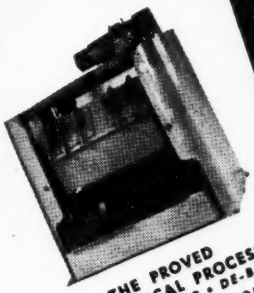
When cleaning the air cap of a gun, it should be simply immersed in a solvent. When small holes become clogged, soak in solvent. When reaming is still necessary, use a match stick, broom straw, or any other soft implement; nothing metallic. Digging out holes with wire or nail may permanently damage the cap or impair its operation.

Whenever fluid leaks from the fluid needle packing nut, this is due to the packing nut being loose or the fluid needle packing being dry. To overcome such a condition, remove and soften the packing with a few drops of light oil, then replace. Tighten the packing nut to prevent leakage, yet not so



In spraying workpieces, each spray operator should be provided with an adequate supply of supplementary equipment, as illustrated herein.

Roto-Finish Equipment



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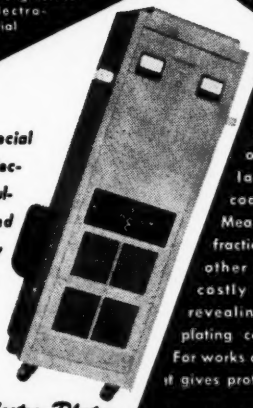

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tight as to grip the fluid needle.

Sometimes there will be air leakage from the front of the gun. This may be due to the packing nut being too tight, a bent valve stem, sticking valve stem because of lack of lubrication, broken air valve spring, worn or damaged valve or seat, or foreign matter on the valve or seat, any one of which may result in the air valve not seating properly, the source of the trouble.

Sometimes there will be fluid leakage from the front of the gun. In this case, a wrong needle size, a broken fluid needle spring, a too tight packing nut, lumps or dirt lodged in the fluid tip, or a worn or damaged fluid tip or needle may result in the fluid needle not having seated properly.

An ever-present annoyance in many shops is a jerky or fluttering spray. When this is encountered, it is due to air leakage into the fluid line. If a pressure or suction feed process is being used, the trouble may be due to lack of sufficient material in the container or tipping of the container at an acute angle, an obstructed fluid passageway, a loose or cracked fluid tube in the cup, or a loose fluid tip or damaged tip seat.

The jerky or fluttering spray may also be accounted for, as to suction feed only, by the use of a too heavy material for suction feed, the fluid tube resting on the bottom of the cup, a loose fluid needle packing nut, a loose, dirty or damaged coupling nut on the cup lid, or a clogged air vent in the cup lid.

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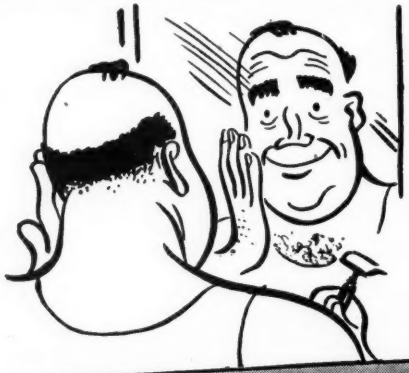

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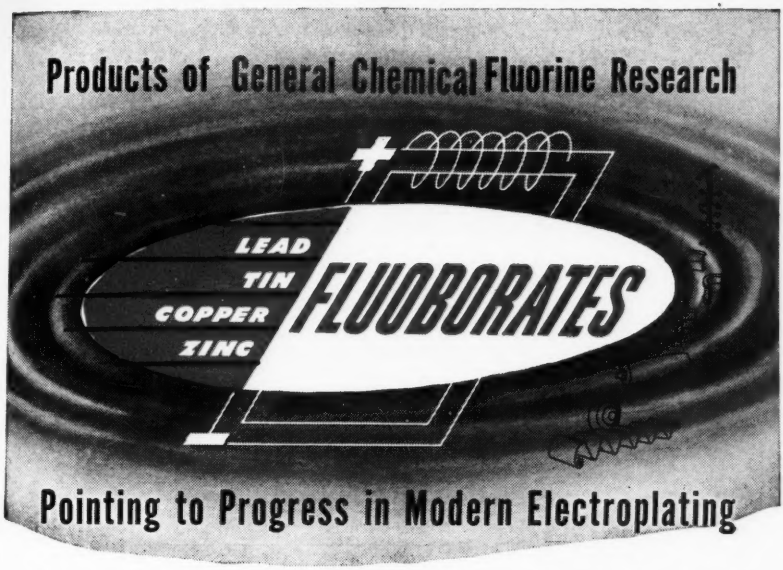

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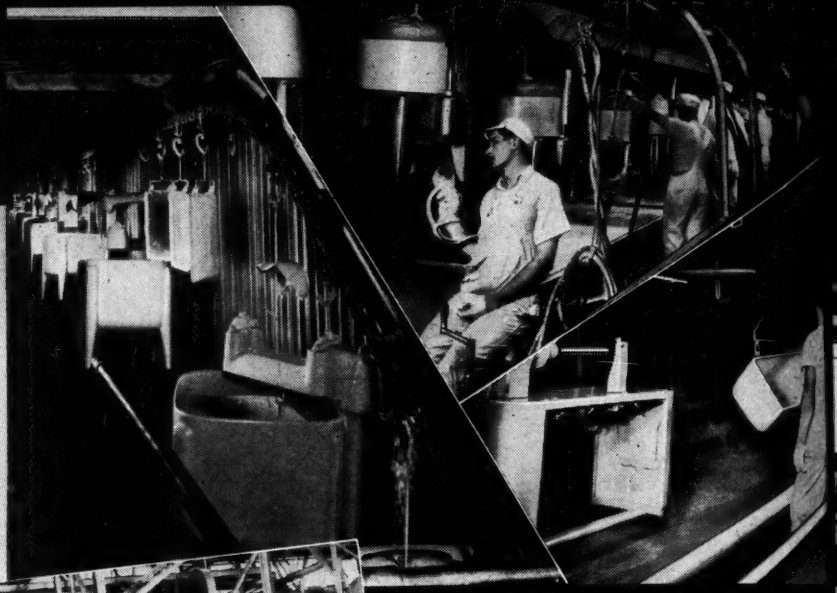

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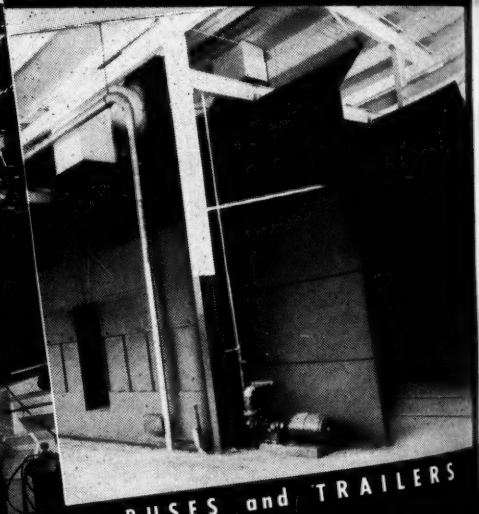

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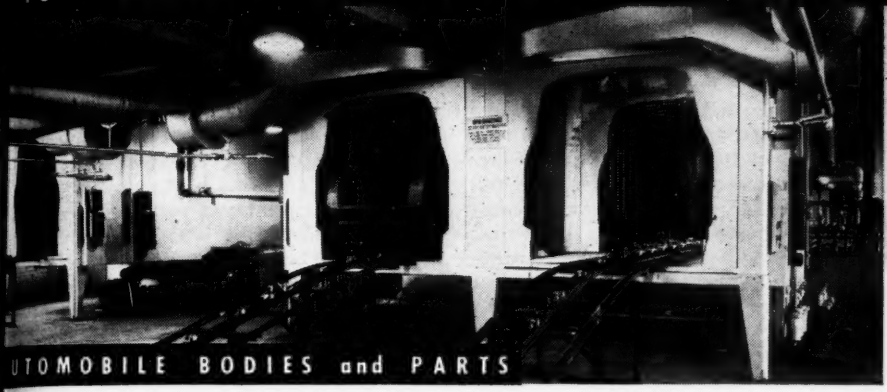

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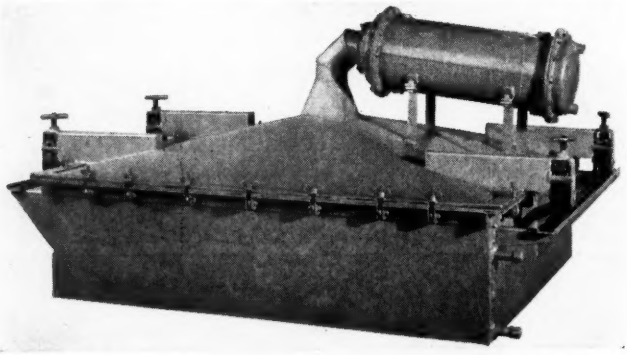
Avoiding Unnecessary Solvent Losses

By JOHN E. HYLER

IT is perfectly obvious that cleaning and finishing processes cannot be carried on without some loss of solvents in vapor form, but it is none the less true that in many places, solvent losses are higher than they need to be. In the case of vapor degreasers, considerable attention has been given to this proposition, with the result that most vapor degreasers now being made have provision for recovery of solvent distillate and for storing it separate from the degreaser proper. Different provisions are made in different degreasers in the matter of reclaiming solvents. Some degreasers have facilities incorporated for gathering the condensates and letting them flow into an outside storage container. Others have arrangements for trapping and holding the condensates until they are manually withdrawn and placed into containers. Also, there are a number of manufacturers of separate solvent recovery stills suitable for use in distilling and reclaiming dirty solvents entirely outside of the vapor degreaser. Among them are the principal manufacturers of vapor degreasers, as well as various others. Some solvent stills have been observed which distill 15 to 20 gallons of dirty solvent per hour and discharge the clean vapors into a degreaser tank as a booster charge.

The location of a vapor degreaser in the shop and the manner of its use have a direct bearing on solvent losses. Such units must be placed where they are protected from drafts, baffling them to provide such protection if need be. Pronounced drafts will draw vapor fumes out of the de-



Equipment for recovering solvent vapors from lacquered work while drying. The unit consists of a tank containing heated oil and a cover on which is mounted a condenser to recover solvent when drying small lacquered items in trays, and so on. The unit is shown in closed position. *(Photo courtesy L. O. Koven & Brother, Inc., Jersey City, N. J.)*

A PICKLE ROOM BOTTLENECK REMOVED!

By a new Wyandotte development . . .

A heavy-duty cleaner, Wyandotte Porenac* is specifically designed to eliminate the cleaning bottlenecks common to every pickle room of porcelain enameling plants.

This balanced formulation quickly takes care of the toughest mineral oil drawing compound.

Porenac is economical, too. Its superior emulsifying action eliminates the necessity for pre-cleaning and saves time. Its concentration requirements are low. Additions are at a minimum and life of solution is remarkably long.

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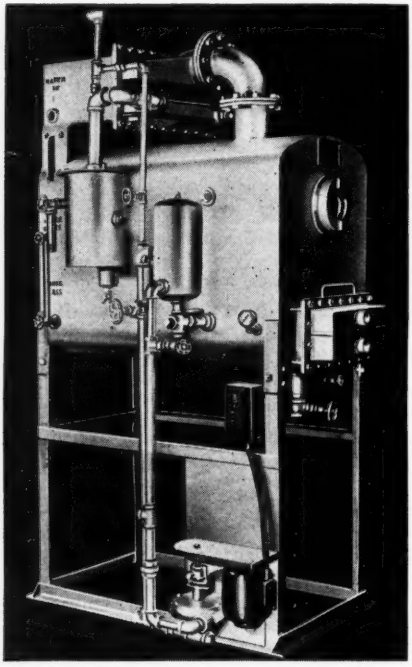
greaser. As touching operation in this particular respect, work must be lowered into a vapor degreaser at a slow rate and removed in the same way. Otherwise, sudden displacement of vapor by the work, as it enters, will cause unnecessary loss, and sudden removal of the work will cause vapors to be drawn after it and lost. Some



Solvent still for use in the recovery of trichlorethylene
(Photo courtesy Detrex Corp., Detroit, Mich.)

leading authorities in this field claim that 12 feet per minute should be regarded as maximum speed for lowering work into a vapor degreaser. Removal can be somewhat faster, but should not exceed 20 feet per minute.

It is interesting to observe that means have been developed and employed to some extent for recovering solvents given off as vapors while finished work is drying. One very interesting application of this kind makes use of a special tank containing heated oil and so designed that trays, filled with workpieces that have just been lacquered, are supported in the tank in such a manner that they are partly submerged in the heated oil. Steam coils are used in the tank to heat the oil, and the heat is transferred to the work by the oil to hasten its drying. A wheel-mounted cover is arranged for the tank in such a manner that it can be rolled into place and secured by hinge bolts on the rim after the trays of work are in place. Assembled on this cover is a condenser which traps the rising solvent vapor, converts it into liquid, and delivers it to be used again. Equipment of this type maintains the oil at a predetermined temperature by means of a thermostat and is built in different sizes and capacities.

Goodrich Spray-Type Pickling and Washing Machine is the subject of a four-page broadside published by The B. F. Goodrich Co., Akron, Ohio. The broadside illustrates and discusses the advantages of the machine in performing pickling and washing operations on a variety of parts. Copy free upon request.

"Whistlclean," an all-purpose industrial cleaner and detergent, is the subject of a six-page illustrated folder released by the American Oil & Disinfectant Corp., 88 Lexington Ave., New York 16, N. Y. The folder describes the effectiveness of the product in cleaning wood and concrete floors, tile, marble and terrazzo surfaces, metal equipment and machinery, and so on. In addition to explaining its detergent qualities, the folder contains laboratory test data on the bactericidal efficiency of Whistlclean in concentrations as low as one ounce per gallon. Practical cleaning tips on the use of Whistlclean are also included in the folder, copy of which is available free upon request.

HOW ZAPON FLOW-COAT ENAMEL Solves problem for Trimble

SUPERIOR wood craftsmanship and fast assembly line production characterize the making of these Tip-Top Kiddie-Baths by Trimble Nurseryland Furniture, Inc., of Rochester, N. Y. This leading manufacturer of children's furniture needed a fast-drying enamel to remove finishing bottlenecks.

ZAPON Flow-Coat Enamel proved quickest, easiest and best for Trimble requirements. This beautiful high-gloss enamel completely covers the Ponderosa Pine wood of the Kiddie-Baths in a *single*, satiny-smooth coat! No undercoat or sealer is required. And, besides, ZAPON Flow-Coat Enamel air dries with lacquer speed.

The use of this ZAPON finish replaced individual hand dipping and 12 to 24-hour slow drying on racks. It enables Trimble to use conveyorized finishing—1,000 feet of track, largely overhead, with 10 feet through the flow-coat booth—thus saving space, time and money. Here you have another typical example of why it pays to call ZAPON for finishes.

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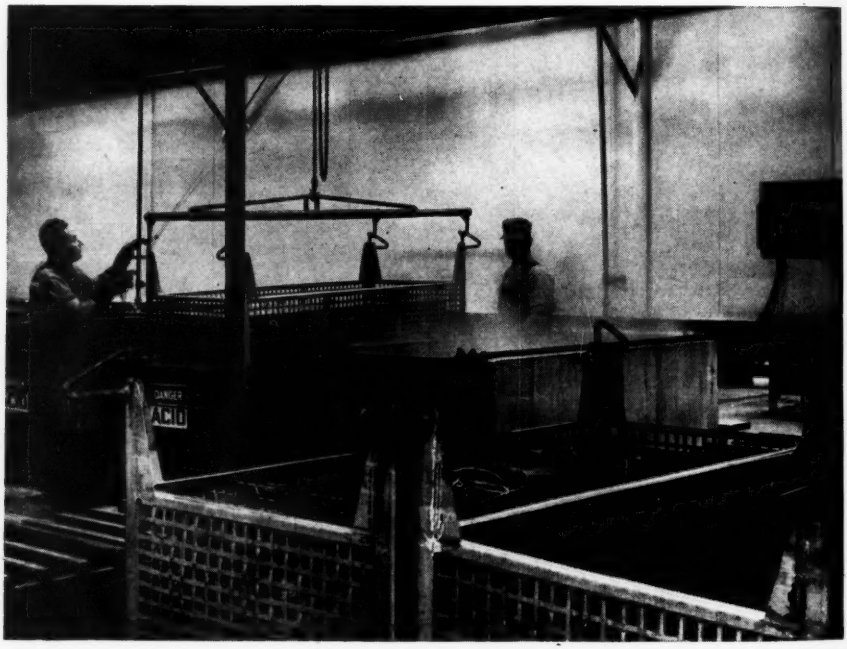
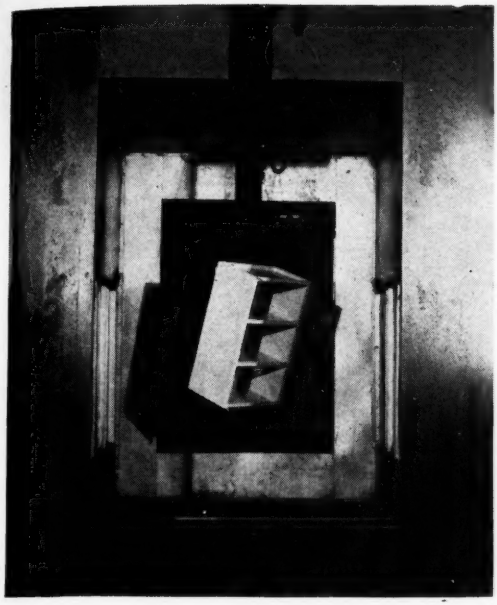
Conversion Calls for New Products and Methods

CONVERSION is a forward-looking process that has only a nod for the past. Old products and old ways of making them won't do. New products are tied in with the new technology. Both points are illustrated at The Guiberson Corporation, Dallas, Texas. Starting with the power distribution system, the plant has been reconverted to continue the manufacture of improved oil field equipment, and the company is expanding into the consumer goods field with a line of steel kitchen cabinets, the manufacture of which requires many new techniques.

A fluorescent lighted area served by a bus distribution system has been

Steel cabinet pieces are prepared for finishing by means of a phosphate coating system in this department of Guiberson Corporation. The tank to the right of the men employs 45 kw. of electric heat.



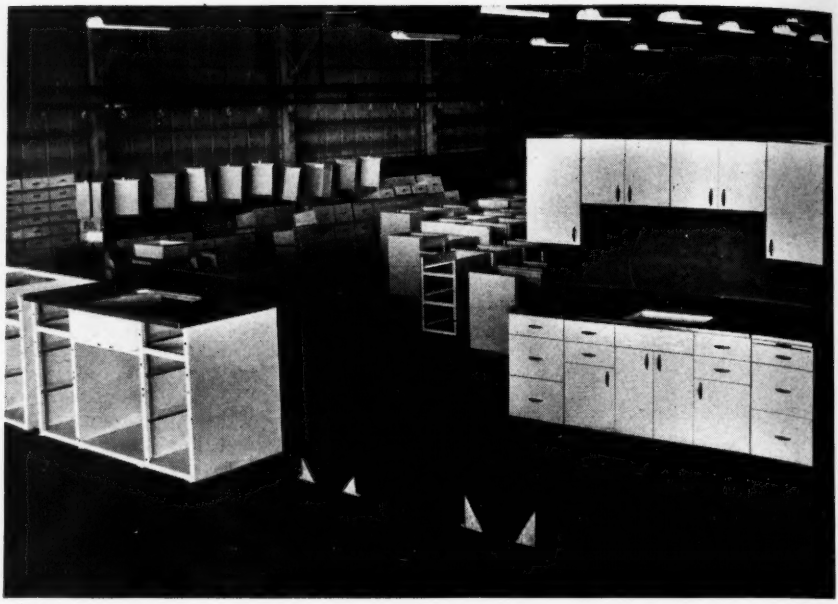


Dried cabinet with a beautiful, high gloss, tough enamel finish emerges from the new electric drying oven.

selected for the sheet metal work on the new cabinets. The pressed pieces are fabricated into cabinets and doors by spot welding. Prior to assembly the pieces are cleaned and their surfaces prepared for finishing with the aid of some 55 kw. of electric heat. Tanks are heated electrically and cleaned pieces are dried electrically. Floor and overhead systems facilitate handling.

The finish provided on each cabinet is a baked enamel, which is described as very tough, high gloss, acid and waterproof — in appearance and quality similar to vitreous enamel. The baking is done in a newly designed, convection type electric oven that is 60 feet long and rated 115 kw. The work is first passed into two new spray booths where it receives a mist coat and a final coat. From the second spray booth it is conveyed into the oven's first zone—held at 200 deg. F. The work is then passed through four heating zones held at 300 deg. F. and emerges through a cooling zone main-

After cleaning and surface treating, steel cabinet pieces are dried in this 15 kw. oven as they pass through on a conveyor.



This illustration shows assembled cabinets after drying.

tained at 200 deg. F. The cycle requires 30 minutes. Temperature controllers provide any desired temperature.

(Courtesy "Electrified Industry")

ACP Technical Service Data Sheets. The American Chemical Paint Co., Ambler, Pa., now has available a series of new and revised technical service data sheets on "Peroline," an oil-like chemical for producing an oiled phosphate coating on iron and steel products that are later to be painted; "Deoxidine" No. 170, a strong concentrated phosphoric acid metal cleaner and rust remover; Solvent No. 3, a liquid chemical for the removal of paints, lacquers, and enamels; "Deoxylyte," a concentrated acid type addition agent used in final rinse baths for both coated and uncoated metal surfaces; and "Cuprodine," a powdered chemical which, when dissolved in dilute sulphuric acid, forms a solution that is said to produce adherent, bright copper coatings on steel surfaces by simple immersion.

Copies of this series of data sheets are available free upon request.

Durco Corrosion-Resistant Fans. A 12-page bulletin on Durco corrosion-resistant fans for exhausting acid and other corrosive fumes has been published by The Duriron Co., Inc., Dayton 1, Ohio. The bulletin contains complete engineering data, including dimensions and capacities, on the five standard sizes of fans made by the company. A description of Duriron, Durichlor, and Durimet, the special Durco corrosion-resisting alloys of which the fans can be built, is included. Some typical applications for the fans are shown by means of drawings. These include exhausting fumes from laboratory hoods, plating, pickling and anodizing tanks, hydrochloric acid etching installations, reaction kettles, sulfuric acid chamber processes, absorption or drying towers, Kjeldahl tubes, fume washers, and so on.

The bulletin also includes information on the type of drives used, as well as Durco hood outlets, bell-end adapters, and Durco drip traps. In addition, complete instructions are provided on how to specify, how to select, and how to order the correct Durco fan for a particular application. Copy of Bulletin 1102 free upon request.

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ANOTHER prominent manufacturer* has "gone G-W" in modernizing the finishing and conveying of parts and now enjoys the maximum advantages of radiant heat. His G-W Infra-Red System gives him:

SPEED—heat is "spot lighted" directly upon the work, processing it in transit.

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FEWER REJECTS—tougher finishes produced by infra-red, reduce smudging, chipping or cracking.

ECONOMY—less power, fewer man hours, conservation of floor space.

SIMPLICITY—G-W systems easily handle all operations of de-greasing, spraying, dipping, baking, drying and cooling. **Name upon request*

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Preparing Iron and Steel for Bright Zinc Plating

By ARTHUR P. SCHULZE

AS products finishing executives well know, zinc plating is a long-established, widely-employed means of protecting ferrous fabrications and assemblies against rust or other corrosion. Yet, due to the development of bright and semi-bright processes, it is only within comparatively recent years that electroplated zinc coatings have become commercially important from the standpoints of protective finishing and decorative plating. This is particularly true in connection with the manufacture of such small articles as nuts, bolts, screws, pipe couplings, flanges, and so on.

Sharp halting of civilian goods output at the outset of the nation's late war production program brought the application of bright zinc plating for decorative purposes to a complete standstill. However, partly because of the critical shortage of cadmium for electroplating prevalent during the early stages of the war, zinc found broader utility for providing corrosion-resistant coatings to ordnance material and other essential war supplies.

Among those on which the then-urgent need for protective finishes was successfully met to a considerable degree by the substitution of zinc for cadmium in war production plating specifications were communication equipment, amplifier cases, fuse and bomb parts, bomb flare cases, mine traps, shell and cartridge cases, gun parts, automotive and aircraft components, electric switch case parts, coil springs and marine fittings.

Now, with the industrial machine geared to the task of beating swords into plowshares, the use of bright zinc plating for protective finishing may decline somewhat as the supply of cadmium becomes more plentiful. This, on the other hand, may be offset to some extent by an accelerated resumption of its use for the purpose of decorative finishing.

Why Is Correct Surface Preparation So Essential?

In zinc plating, as with other types of electrodeposition, thorough degreasing of the surface is a prime requisite which determines in no small measure the adhesion, uniformity and protective value of the coating or finish subsequently applied. The surface must be put in a chemically-clean condition! There have been instances by the score where base metal surfaces not properly prepared for plating with the correct techniques subsequently resulted in peeling and blistering of the finish. Efficient degreasing,

therefore, is of paramount importance; it is the first step to maintain quality control as well as eliminating or minimizing rejects.

From the viewpoint of output, cleaning must also perform its assigned task on a consistently fast, dependable schedule to keep pace with preceding and subsequent operations, and thus materially assist in keeping the production line moving along smoothly, without hitches or interruptions attendant with faulty cleaning. Various degreasing and cleaning methods are available for preparing iron and steel for bright zinc plating. Ranking high on the list of those most widely employed are the following four techniques:

ARTHUR P. SCHULZE

1. Still or soak tank, using either an alkaline material or an emulsifying solvent, either separately or in combination as a two-bath process, depending upon the nature and amount of foreign matter present, shape and size of work, and other factors.

2. Electrocleaning tank, employing direct and/or reverse current, depending on conditions, and using materials specially designed for this work.

3. Automatic mechanical washing machine of the fixed spray, revolving wash arm, rotary drum and splashing or cascade types, using alkaline degreasing materials most suitable for application by this method.

4. Combination of one of these methods with another, depending upon individual plant conditions.

Still or Soak Tank Degreasing

Where this procedure is followed, parts are immersed in a solution made up with a suitable alkaline detergent at a concentration of from 4 to 8 ounces to each gallon of water. The temperature of the solution ranges from 180 to 212 deg. F. After soaking from 5 to 15 minutes or longer where exceptional conditions indicate, the work is withdrawn and rinsed in a cold, free-flowing rinse tank.

This is followed, wherever possible, with a final hot rinse to prevent carryover of the cleaning solution into successive pickling baths and plating solutions. Plant experience shows that most types of quenching oils, cutting oils, drawing and stamping compounds, and so on, usually encountered are completely removed by this method, leaving surfaces in the chemically-clean condition required for zinc plating.

Agitation of the cleaning solution is not absolutely essential in still tank degreasing, but it has been found almost universally that agitation is desirable for the most efficient and economical results. This may be achieved in a number of ways, the simplest of which is that of vigorously boiling the solution. Still another common practice installing baffle plates in the tank to produce convection currents. For heating the solution, one of the most practical ideas is to install steam coils on the work side of the tank.

For cleaning articles coated with pigment drawing compounds, a different degreasing agent is often required. Soaking of the work for a short period in a boiling solution of a more vigorous-acting alkaline detergent, 8 to 10 ounces to each gallon of water, produces completely satisfactory results in many cases. Of further interest in

this connection is the additional fact that the cleaning of drawn and stamped parts invariably can be effectively expedited and cost reduced by simply replacing pigmented compounds, wherever practical, with certain other types of drawing and stamping compounds.

Used with water or oil mixtures, depending upon the individual problem encountered, these specialized materials incorporate those characteristics of adhesiveness, cohesiveness and lubricity necessary to prevent metal-to-metal contact. Of equal importance, although not so frequently recognized and appreciated by many metal-finishing men, is the further fact that these particular compounds are more readily removed in alkaline cleaning solutions from drawn or stamped work before subsequent finishing. Formulas for drawing, forming and stamping materials vary so widely from plant to plant that consultation with a trained service engineer of the materials supplier is recommended to meet individual drawing and stamping requirements most satisfactorily.

Emulsifying Solvent Pre-Soak

On certain classes of work, particularly where smut or deposits of other inert matter either unusually heavy or of a very exceptional and tenacious nature are involved, a two-tank technique is recommended for proper surface preparation. Preferably used for this pre-cleaning or "pre-soak" in a great majority of cases are specially designed emulsifying solvents, which are non-flammable and also non-combustible at common temperatures.

For example, short immersion of work in a tank charged with a solution of Oakite Saturol, followed by one or two rinses in either clean running or warm water, generally leaves the work in excellent condition for rapid degreasing in the final cleaning bath.

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ROHCO 50 For still or Automatic	Uniform up to 75 amp./sq.ft.	Range 1⅓ to 2½ oz./gal.	1½% of cadmium metal cost	Hull Cell or ratio to cyanide	No breaking in period	Excellent, good recess plating

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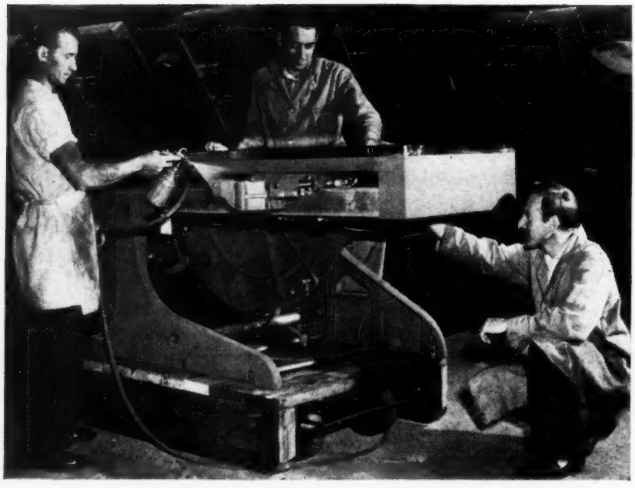
Alkaline Precleaning

In other instances, especially where pre-cleaning is required for final degreasing by electrolytic methods and where the use of an emulsifying solvent pre-soak is not entirely suitable, this particular operation frequently can be performed with alkaline materials. Such materials suggested for this application combine emulsifying properties and wetting-out qualities which enable them to remove a wide range of foreign matter encountered in the field of metal cleaning. They have, in addition, long solution life, plus the ability to stay in balance, even when heavily contaminated.

Processing cycle comprises (1) immersion of parts in recommended solution of from 4 to 10 ounces of material to each gallon of water for a period of from 5 to 20 minutes, depending on conditions, at a temperature of 200 deg. F.; (2) thorough rinse; and (3) final cleaning bath.

Electrolytic Cleaning

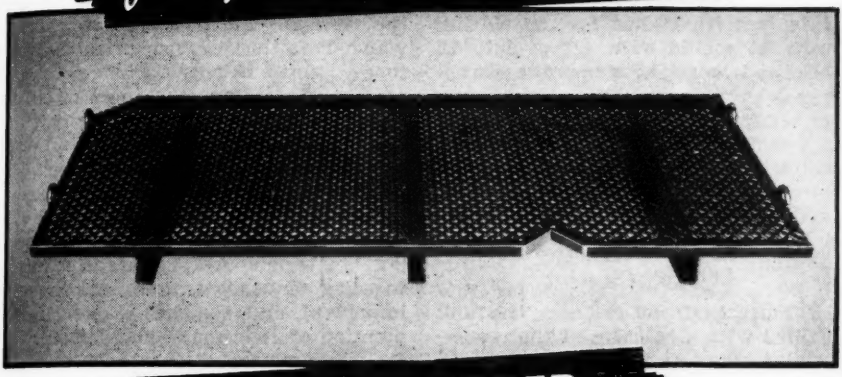
Electrolytic cleaning procedures, which provide for passing a low voltage direct and/or reverse current through an alkaline bath, usually produce thorough, uniform results in preparing iron and steel surfaces for electrodeposition of bright zinc coatings. Cathodic cleaning has been, until recently, the more widely utilized method since it liberates a greater quantity of gas from the surface of the work beneath the oil or grease film during the degreasing period, effectively loosening up and breaking up oil and grease accumulations and producing an agitating action that greatly facilitates and speeds up the process of emulsification in removing them. The past few years, however, have witnessed a steadily growing trend toward the employment of anodic degreasing at high current densities since it shows certain important advantages from the standpoints of absence of hydrogen embrittlement and smut deposition on some types of work. Today, as a result, it is frequent-



WORKMEN are shown touching up the gray crackle finish, polishing the chrome, and making final adjustments on a North American Philips X-ray diagnostic table prior to shipment from the company's Dobbs Ferry, N. Y., plant.

(Photo courtesy North American Philips Co., Inc., New York, N. Y.)

Here's Positive Protection for Your Plating Tanks!



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ARCO Rubber Insulated Tank Grids are *low cost insurance* against costly replacement of tank linings, agitation coils and plating solutions. Arco Grids save you money from the day you put them down in your tanks.

They prevent serious damage to tank linings and air-agitation coils generally caused by falling sword ends, baskets and heavy, sharp work pieces . . . make possible the quick retrieving of fallen work . . . are easily removed for cleaning of tank, cutting "down-time" costs . . . prevent corrosion and contamination of solutions . . . reduce solution loss . . . assure free flow of solution at bottom of tank . . . can be used as inexpensive replacement for acid brick.

Fabricated of expanded metal, reinforced by angle iron and supported on channel iron. Heavy eyes at four corners permit easy lifting and removal from tank. They are completely coated with a smooth seamless covering of ⅛-inch Arco Semi-Hard Rubber Insulation that will not crack or peel.

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Rubber Processing

ly preferred over cathodic cleaning in numerous plants and shops.

In electrocleaning, proper equipment properly installed plays a large part in securing successful results. Wherever possible, a suitable tank installation should be equipped with a generator of its own—one that is separate from that used for the plating baths. It should be a set of 6 to 12 volts and have the amperage necessary to provide from 20 to 50 amperes per square foot of work to be cleaned at one time. Also, a double throw-switch should be installed in order to permit the work to be degreased both anodically and cathodically where this is desirable.

Cathodic Cleaning

For direct current cleaning, the tank is filled with a solution of the recommended alkali, 6 to 8 ounces to each gallon of water. Parts are immersed in this solution from 1 to 3 minutes. Cleaning is then followed with the customary rinse.

Anodic Degreasing

With reverse current degreasing, the tank is charged with a compound developed expressly for this particular application, 8 to 10 ounces to each gallon of water. The temperature of the bath should range from 190 to 200 deg. F., and the current density should be 40 amperes per square foot.

From time to time, a combined cathodic cleaning-anodic degreasing routine is desired or required because of certain unusual individual conditions. Here, the usual procedure in many plating departments and shops consists of three steps. First, work is cleaned cathodically from 1 to 3 minutes to remove the major portion of the foreign matter present, after which it is then degreased anodically for ½ minute or slightly longer to remove any metallic substances or soap films which have deposited during the cathodic operation. The cycle is then completed by cathodic cleaning, if necessary, for 2 to 3 seconds to free the surface of the work from oxygen.

Of all the factors involved in selecting materials for electrocleaning, foaming tendency is among the more important, and, for that reason, brief mention of it is made here. The vigorous generation of gas tends to produce foam or sudsing which, when too great, overflows from the tank. Excess foam also is frequently a contributor to recontamination of work upon its removal from the cleaning tank. The foam, in addition, may harbor explosive gas mixtures of oxygen (originating at the anode) and hydrogen (developing at the cathode), which might be ignited by a spark from the work rod, causing an explosion of sufficient intensity to throw the solution from the tank.

To summarize, it should be mentioned that even though electrocleaning

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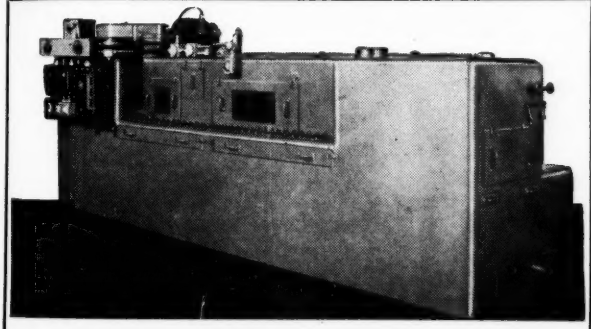

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techniques are ordinarily utilized when the production of chemically-clean work is required, optimum results frequently dictate precleaning of work in soak tanks or washing machines. With the bulk of the foreign matter thus removed, the rate of contamination of the electrocleaning solution is substantially lessened and its useful life accordingly prolonged, thus contributing to lower unit cleaning cost.

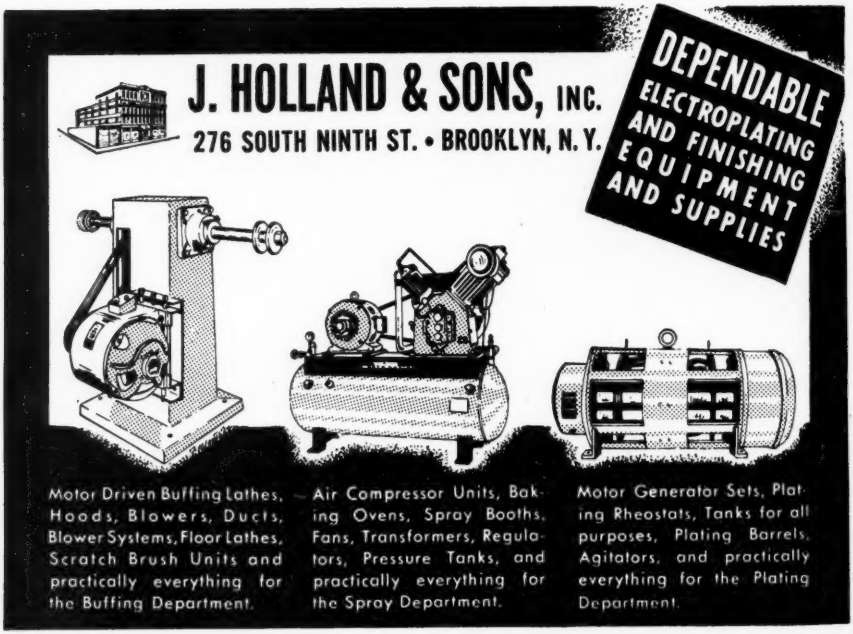
Mechanical Washing Machine Methods

Where parts are precleaned in this manner, the solution tanks of the metal-washing machine are usually charged with an alkaline detergent at a strength of from ¼ to ¾ ounce to each gallon of water. Any one of a number of suitable proprietary compounds, obtainable from various dependable sources of supply, may be used with complete satisfaction. But whatever particular material is selected, however, it should incorporate certain essential features to assure consistent cleaning efficiency and economy.

Such a detergent should, first of all, provide rapid cleaning action needed for effective oil and grease removal even when the cleaning cycle is short. Then, too, it should retard foam formation and help keep sprays and solution lines free of insoluble deposits that impair the operating efficiency of the machine. Free-rinsability, of course, is another "must."

Oxide, Scale and Rust Removal

Acid dipping or pickling follows degreasing when oxide, scale or rust formations are also present on the work. Due to differences in manufacturing practices, character and thickness of deposits encountered and other incidental factors, formulas and methods for performing this vital operation vary widely from one plant to another. Thus, it is virtually impossible to out-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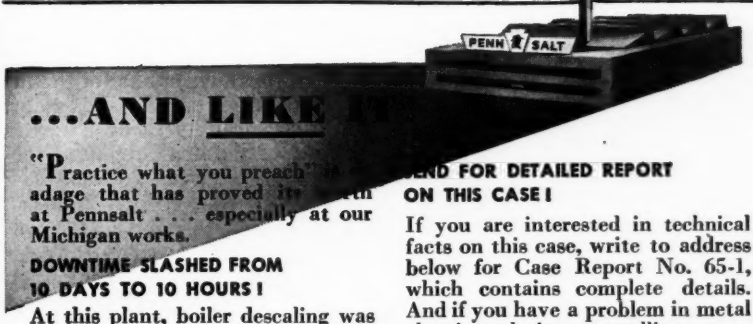

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line a standard procedure which will meet all acid-cleaning requirements satisfactorily.

Two of the most commonly used pickling acids, each employed alone either as a single acid dip or with each other consecutively as a two-bath treatment, are sulphuric acid and muriatic acid. Sulphuric is generally used at a concentration of from 5 to 20 per cent by volume, depending upon the type and amount of scale to be removed, production rate and tank capacity. The temperature of the solution ranges from 120 to 190 deg. F. Muriatic acid is generally employed at room temperature at a concentration of from 10 to 50 per cent, this also depending on the same general conditions previously noted.

In pickling iron and steel, addition of a suitable inhibitor to the particular acid used has become virtually standard practice throughout industry to reduce or control attack on base metal without appreciably reducing or retarding the descaling or derusting rate of the acid. Such an agent conserves acid, minimizes pitting of the metal or eliminates overpickling, and reduces the severity of hydrogen embrittlement and acid fumes.

Typical of the more well-known "pickle controls" is one particular inhibiting agent which has been put to wide usage to improve pickling practices in plants and shops of all descriptions. Exacting tests and extensive operating experience have conclusively proved it promotes economy of acid by preventing pickle baths from becoming needlessly weak and contaminated with iron salts and conserves metal by restricting weight loss of sound metal.

With an effective inhibitor of this type, less fumes are given off by acid tanks. A significant reduction in hydrogen embrittlement and blistering results as well. To assure economy in the application of this particular pickle control, the manufacturer supplies its users with a set of scientifically prepared charts and diagrams which accurately show the exact amount of inhibitor required for the degree of protection desired.

Occasionally, various unusual or special oxide, scale and rust conditions develop or crop up where the regularly-used acid dips and pickling solutions fail to provide the required results. Some plants in such instances have found the use of a specialized acid-detergent highly advantageous. Although not recommended for replacing those acid baths used in volume production practice, it successfully dissolves and disintegrates a great many types of scale, rust and oxide films which resist removal by commercial raw acids, accomplishing this with less action on iron and steel than many other materials. This agent, furthermore, induces very little hydrogen embrittlement; in some cases,

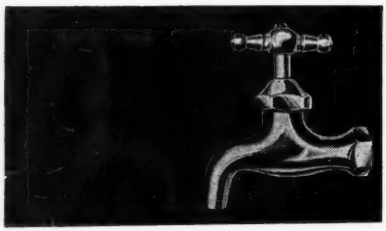

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Illustration shows unbuffed deposits before and after Lustrebright.

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Neutralizing

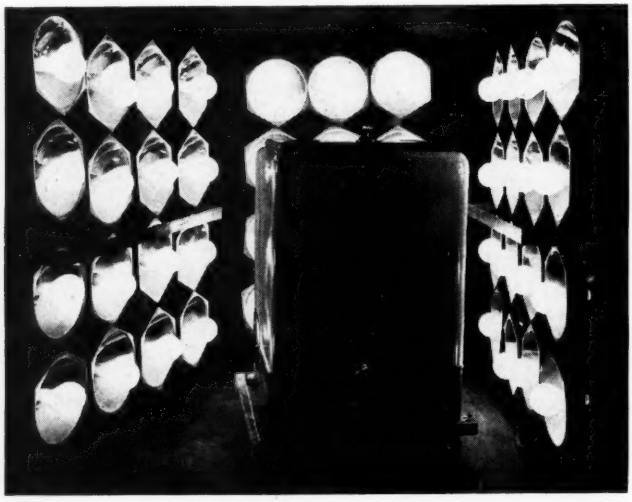
Parts should be neutralized following descaling, derusting or deoxidizing by any type of acid treatment to offset the effects of any residual acid in the pores of the metal. Where the surface preparation cycle is relatively simple and the volume of output comparatively small, the alkaline cleaning tank may also be used as a neutralizing bath.

However, in the interest of high-speed, straight-line production, a separate neutralizing tank generally proves more practical. A number of suitable alkaline materials are readily adaptable for neutralizing operations; they are extremely free-rinsing, a factor of considerable importance in the preparation of iron and steel for bright zinc plating.

Technical Engineering Advisory Service Available

Generally speaking, no two surface preparation problems are exactly alike. While the procedures described for preparing ferrous metals for bright zinc plating have provided satisfactory in multiple practical plant operations, they may not prove entirely suitable under different conditions, and, therefore, must often be modified to varying degree. That is why so many plating superintendents and foremen, when confronted with a metal surface preparation problem that appears incapable of solution by ordinary methods, find it sound policy to consult a technical service representative of an aggressive, alert cleaning materials manufacturer. For invariably they have discovered through past experience in helping others untangle their production cleaning snarls, he is able to offer ideas and suggestions that often lead to the increased degreasing efficiency and economy desired.

Monarch Brand Sandblast Hose for use in sandblasting foundry flasks, castings, and other metal surfaced pieces, as well as in cleaning stone and brick, is the subject of a four-page folder now being distributed free by Hewitt Rubber, 240 Kensington Ave., Buffalo 5, New York.



THE accompanying illustration shows an infra-red paint drying booth where stoker-fired furnaces are dried at the Salt Lake City, Utah plant of Rheem Manufacturing Company.

(Photo courtesy Rheem Manufacturing Co., New York 22, N. Y.)

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Barrel Finishing of Metal Products

Part 5—The Tubbing Machine

By H. LEROY BEAVER

Barrel Finishing Consultant
Lansdale, Pennsylvania

DURING the entire period covered by the publication of the initial series of discussions on barrels and barrel finishing procedure and since the start of the current series, we have had a large number of requests for information regarding a device quite generaly spoken of as a "tubbing machine." The questions asked are: By whom was it orignated and when; what was its primary purpose; what kind of parts was it designed to finish, is the tubbing machine type superior or inferior to what we might term the "fully contained" type?

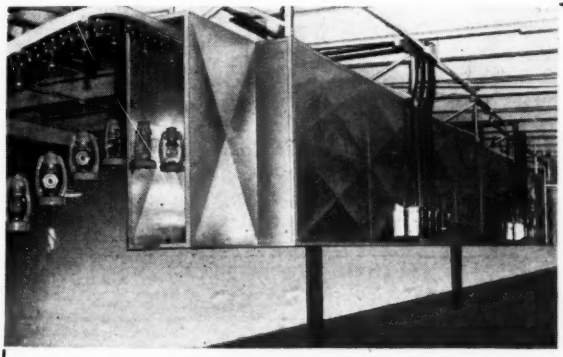
In order that we may undertake an answer to all of the above questions and many more of like import, we will have to ask you to go with us on a little journey from wherever you may be at the time of reading to Providence, R. I. The time of this little journey was in the Fall of the year 1918, a matter of about twenty-eight years ago, our objective being to visit the office of Everett A. Barton, a manufacturing jeweler of that city, and along with this, shall we say, side-trip to Attleboro, Mass., for a brief visit with Harvey Barton, a brother of Everett A. Barton and co-originator of what is now pretty generally termed in the manufacturing field as a tubbing machine.

Our reason for being there was due to the fact that we had been commissioned to conduct what we were instructed should be, in all respects, the most exhaustive investigation and examination of the origin and operation of every conceivable type of revolving barrel mechanism used in any way in the production of, or finishing of, any metal part or parts whether solid or plated that could be found. We were to trace, if possible, back to the inventor originator, to effect, if possible, personal contact with him and to learn directly from him as much information as possible respecting his conception of his particular device, whether it had been made the basis for the formation of a business which had to do with the manufacture and sale of such device, and to what extent it had been accepted by the manufacturing field. Now, to anyone even reasonably familiar with patents and patent procedure, it will be quite apparent that our quest was in truth and in fact an investigation to determine a matter of alleged prior use, this being a most important factor in patent liti-

gation. This assignment took us to many places for interviews with many people and the background thus formed has been of inestimatable benefit in all of our subsequent efforts in barrel finishing research. From time to time we will try to take you with us on other little journeys to other inventors of several types of barrels so that you too may have the same background from which to base your own conclusions.

Everett A. Barton lived in Providence for many years, was completely familiar with the business of the manufacture of jewelry, and had convinced himself that there must be some better and more economical methods of finishing than to require that each work piece be individually handled. He told us of a visit one day to a local steam laundry and of observing the operation of a laundry wash wheel which was a perforated drum revolving within an outer case that held a soap solution. Before him was a device which, if duplicated in a miniature way, might be adapted to the finishing of small jewelry parts by the frictional resistance of one part against another. Or, as he put it, if enough parts were put into a small drum with the same soapy water that the laundry used, the soap water would act as a washing or cleaning medium and the parts rubbing against each other would become polished. And here you will note that in his initial conception he had no thought of the soapy water acting as a lubricant which is after all its most important function in barrel finishing, but only that the soapy water would act as a cleanser of jewelry in the same way that it acted as a cleanser of family washables in the laundry which he patronized.

Now Everett Barton was not the kind of man who, once getting an idea like this, could dismiss it from his



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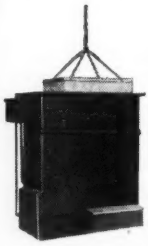
mind, so he proceeded to do something about it. He first constructed a rectangular box or trough large enough to easily accommodate a small keg which he explained was roughly nine inches in diameter and fourteen inches long. Before installing shafts on either end of the keg, he loosened the hoops on one end, removing the wood end, and then, not satisfied with the smooth interior, he proceeded to go even the laundry one step better and incorporate into his initial barrel something of the properties of the family washboard He secured strips of one-half inch half-round white pine wood which he spaced at regular intervals longitudinally on the inner surfaces of the keg. He then replaced the end, but, again coming back to the laundry wash wheel, proceeded to bore holes at regular intervals and on lines that did not interfere with the longitudinal strips. These holes were for the purpose of providing means of ingress and egress of the soapy water solution in the tub or trough precisely as he had observed it in the laundry, but he insisted that the strips were for the purpose of causing the parts in the barrel to obtain a more thorough stirring up than they otherwise might receive. As to the quantity of water in the tub, he estimated that to be from eight to ten gallons but had never made an actual measurement of the amount. One end of the shaft had a tight and loose pulley and he said the speed averaged between 45 and 50 revolutions per minute.

In 1901 and throughout 1902 when this barrel was built, Everett and his brother Harvey manufactured several of these barrels which became the subject of U. S. Patent No. 713379. In 1903, Everett engaged in the manufacturing jewelry business in Providence. He said that in his initial operations he had no steel balls and thus used a mixture of jewelry and small German silver punchings. He recalled that it was in January or February of 1903 that he obtained his first steel balls and then due to an insufficient quantity of balls, he added punchings so that the load of burnishing material just about filled the keg one-quarter full. (Please keep in mind the year 1901 for it marks the advent of another type of barrel which we will discuss with you in a later paper.)

After some experimental use, he found that the cylindrical keg with its washboard corrugations was not entirely satisfactory, so his next development was an eight-sided cylinder of the same dimensions as the previous keg. This, he operated for a few months and then redesigned it by placing in it a dividing partition wall so that he could "work on two orders at the same time." However, this idea proved to be most unsatisfactory for his work and was also discarded.

His fourth type of barrel followed the one from which he had discarded



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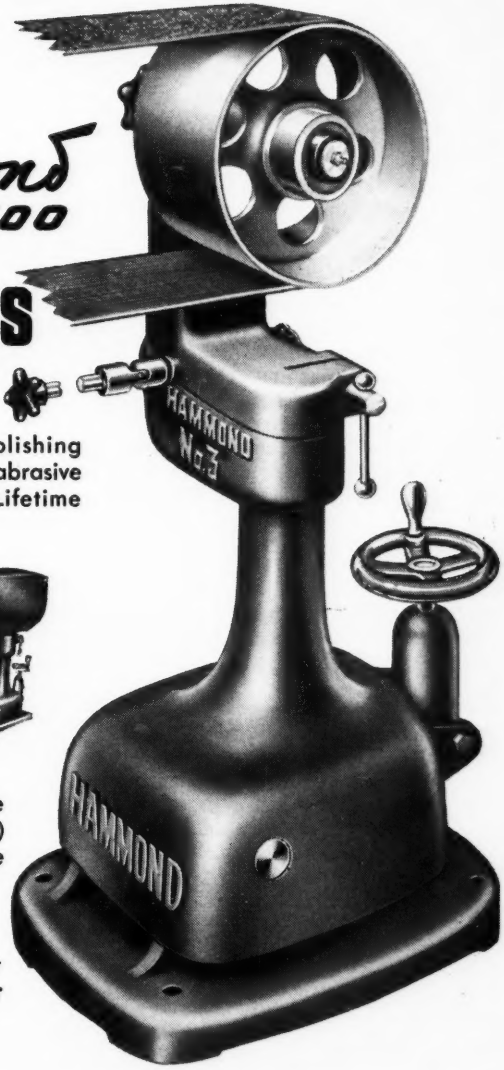

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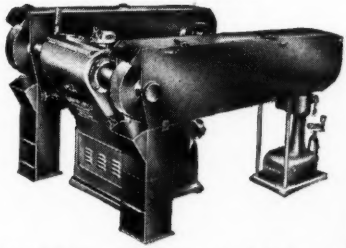

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the center division that had been found unsatisfactory. On his fourth type, he constructed a reel that was a slatted device in which a removable cylinder could be locked in position. This first reel held two eight-sided small cylinders that were operated in the tank in the same way and at the same speed as the previous barrels. This two-cylinder job was produced, as he recalled it, early in 1904, and the cylinders were each eight by ten inches in size. In the first of these barrels, he eliminated the corrugations, but on a later model he revived the corrugated interior idea, only now instead of running the corrugations longitudinally, they were installed in alternate sides of the barrel, running at an angle of 45 degrees with the length of the side. Thus, for instance, one side would have the corrugations at an angle of 45 degrees running to the right, the next side would be plain and without corrugations, and the next side would have corrugations at 45 degrees to its length but running to the left, and so on.

This was followed by a fifth type which was similar to the fourth or two-cylinder type except that three cylinders were used instead of two, and these also contained the corrugations as just explained. The inside of the three-compartment barrel measured seven inches in diameter by five inches in length. In both the two and three-cylinder machines, the opening consisted of one side or panel, and, in the three-cylinder machine, this opening was about three and three-quarters by five and one-half inches in size.

We asked him something about the nature of the parts he regularly finished and he said that they principally consisted of chains and chain findings, swivels, rings, harness ornaments, buckles, brooches, scarf pins, and beauty pins. If chain was to be pol-

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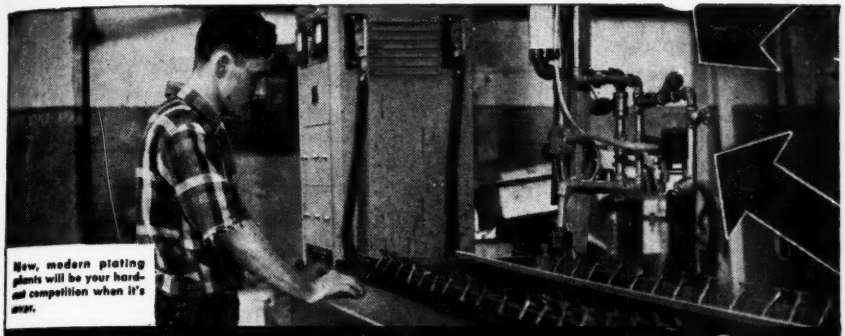

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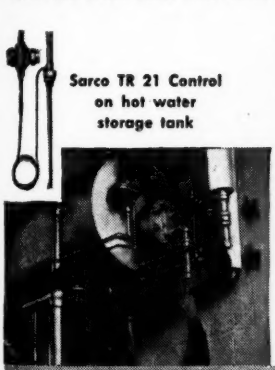
You can speed up production, eliminate rejects and reduce fuel costs by the addition of Sarco equipment to your present installation. The Sarco representative will study your plant — make recommendations—save you time and money without obligation.



Sarco TR 21 Control on hot water storage tank

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ished, a hank or skein of about 30 to 40 yards was operated on at one time, but if links, then about two quarts in bulk was an average load.

You will remember that in Mr. Barton's original keg, he stated that the keg was operated about one-fourth full of either balls or punchings or a mixture of these parts, and so we asked him whether this same ratio was followed in his later designs. He said quite the contrary for that since he could get balls these later styles were always operated at from one-half to two-thirds full of balls and punchings and then only sufficient parts to be finished were added to make a complete load.

Right here an interesting thing happened for we went out into the factory to examine his then currently operating barrel in which wedding rings for the 5 and 10 cent store trade were being polished. The loads from two cylinders were emptied out on the separating screen which he had mounted over a sink and which, of course was of conventional type. As each was emptied, the burnishing material went through the screen while the rings were retained on the screen. The quantities seemed very small and so we asked him to check on this. In so doing we found that in one cylinder the depth of material was exactly two inches and in the other just two and one-fourth inches. In other words, here was the actual inventor of the barrel itself doing just exactly what many present-day operators are doing and that is, running this type of barrel with a completely inadequate load to assure anything that would even approximate a satisfactory finish.

Like most other operators of not only this type but all types of barrels, they start blythely on their way with a full load and then in one way or another manage to lose materials from time to time and even when loads drop to one-half of normal apparently give no considerable thought to bringing their barrels back to proper load by the addition of more burnishing material. They do, however, manage to do a quite considerable job of wondering just why they cannot obtain the same character of finishes that they formerly obtained.

We asked Mr. Barton whether he followed the same procedure in the operation of this cylinder revolving within the tub of soapy water as was used in the operation of the wash wheel he had seen in the laundry and which gave him his initial inspiration for the development of his metal finishing barrel. He said no, that to do this would require too much time in emptying and refilling the tub or trough and that it would be too expensive with relation to the quantity of soap used. He said that sometimes he changed the soapy water twice a week and sometimes only once, a system that we pretty strongly suspect is

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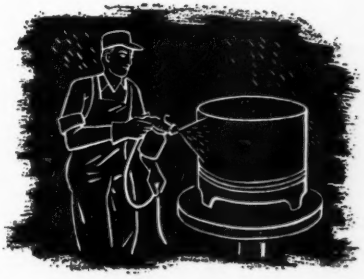

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largely followed by the disciples of the Barton type barrel to this day.

It is not a matter of record that Mr. Barton ever constructed or used a barrel of the oscillating type but confined himself to only the regulation horizontal type of barrel, and it will be noted, too, that irrespective of the shape or form of any of the five types he used, they were all operated at the same speed (45 to 50 r.p.m.), generally with adequate loads. Small barrels operated at high speeds could produce finishes only by the action of impingement rather than by continuously sustained pressure within the burnishing mass itself.

It is quite apparent that neither Everett Barton nor his brother Harvey ever gave thought to such a thing as the porosity of a plated surface or the factor of pressure to close the pores of a plated surface in order to prevent corrosion of the base material or of the cold working of a plated surface to harden it for resistance to wear. All that they sought, and indeed all that they achieved, was a superficial polished surface, and it is suggested that, in fact, this is the only kind of a surface possible to obtain by the use of light loads and by the use of barrel speeds wherein both the parts to be finished as well as the burnishing materials are thrown about in all directions, the parts being sometimes within and sometimes without the burnishing mass. And as to the oscillating type, it must have been at just about this time that the first of the Edmunds Barrels were brought to this country from England. These were all of the oscillating type and the probabilities are that someone subsequent to Mr. Barton simply copied the oscillating motion of the Edmunds Barrell and adapted it to the Barton Barrel.

It will be noted that we speak of these so-called tubbing machines only

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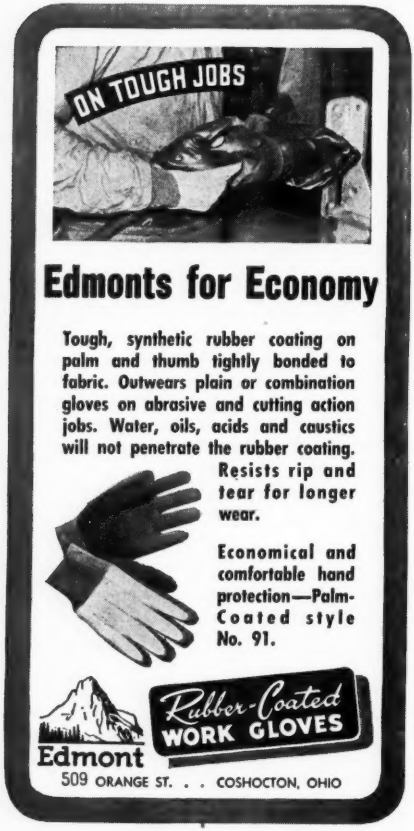
as the Barton type, a name by which they are seldom if ever referred to, but this is only in accord with our established practice of assigning credit for the particular type of barrel to the actual originator of that type. However, from all that our investigation disclosed, it is apparent that back in the early nineteen hundreds, the Barton was the only barrel of this type available, and since that time, several manufacturers have adapted and manufactured this type of barrel.

The barrel was designed for the finishing of jewelry, principally of what we now term the costume type, and it has largely been confined to that special field down through the years, and whether wisely or unwisely we perhaps should not presume to say.

There is still considerable to say on the question of the operation of the tubbing machines which space will not allow in this issue, hence a continuation of this discussion will be published in the February issue.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Finishing Clinic

Classification of Nickel Plating Processes

By DR. ALLEN G. GRAY

•

A Monthly Digest on Current Technical Progress Indicating Significant Trends and Developments in the Finishing Industry

•

DECORATIVE nickel plating, followed by chromium, to produce a gleaming, bright, tarnish-resistant surface is certainly one phase of metal finishing which the production man will become more and more concerned with as time goes on. The future is expected to bring decided progress and expansion in bright nickel plating and in the use of heavier coatings for corrosion protection. During the past few years, there has been a decided trend toward high speed plating. Copper (undercoat for nickel) and nickel baths, especially those of the bright plating variety, have been improved and new ones have been developed to the point that the production minded plater can at least double or triple the current densitites previously employed. The following discussion presents a classification of the various types of nickel plating processes with working bath formulas based on a "Symposium on Nickel Plating" held at the 1946 Annual Educational Session of the Chicago Branch of the American Electroplaters' Society.

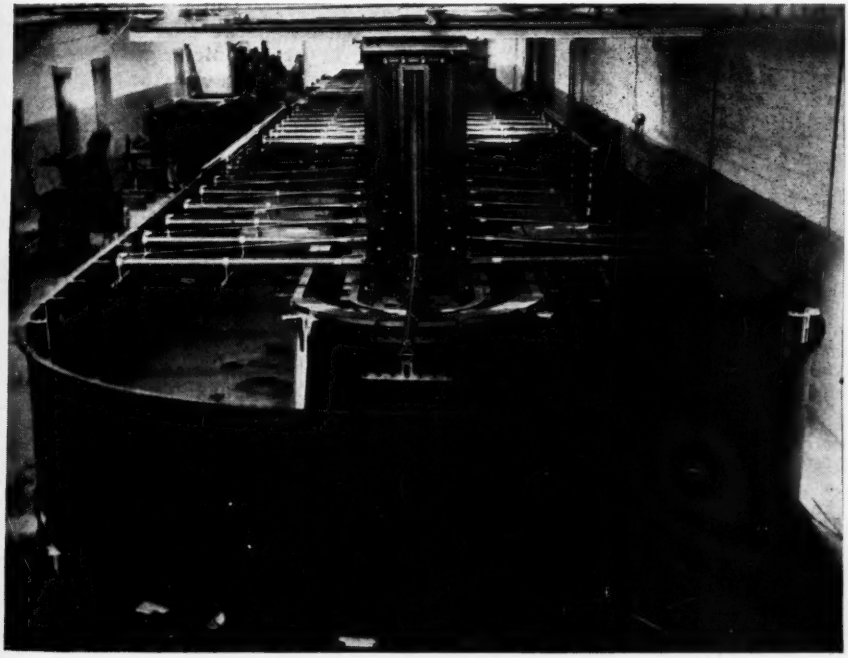
In discussing **Cold Nickel Plating and Soft Deposits,** Vincent Mattacotti of the Milwaukee Plating Company pointed out that the use of this type of solution has declined progressively with the introduction of other types of solutions. Prior to the war, cold nickel solutions were used to some extent on items such as jewelry and picture frames—items that did not require much in the way of thickness of deposit. Cold bright solutions containing gum traga-

THIS MONTH . . . Classification of Nickel Plating Processes . . . Proper Attention to Primer Application Will Improve Quality of Finishes . . . Treatment of Aluminum Surfaces for Improved Paint Adherence . . . Test Panel Cleaning Method . . . Water Dip Lacquers May Be Useful in the Finishing Room.

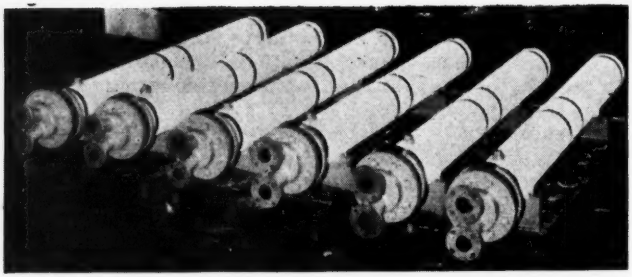
canths were used, for example, for flash plating brass articles prior to silver or gold plating. Cold solutions were also operated in barrels for the plating of parts which were subsequently to be ball burnished. Where a bright deposit had to be produced in the barrel, the introduction into the solution of a brightener such as cadmium, gum arabic, or gum tragacanth would suffice. These bright deposits required no burnishing. However, in comparison with present-day standards, their thickness was of a low order, they were brittle, and it was quite difficult to chromium plate over them.

Among the cold nickel plating solutions is the so-called die-cast or high sulfate bath, of the Thompson type, consisting of 9 oz./gal. nickel sulfate, 2/3 oz./gal. ammonium chloride, 2 oz./gal. boric acid, and 20 to 30 oz./gal. sodium sulfate decahydrate. Cold nickel solutions are ordinarily operated at temperatures ranging from 60 to 90 deg. F., a pH of 5.2 to 6.0, colorimetric, and current densities not exceeding 20 amp./sq. ft. and, in general, more nearly 3 to 5 amp./sq. ft. Another cold nickel solution, the so-called double nickel salt bath, is made up to 14 oz./gal. nickel ammonium sulfate, 2 oz./gal. ammonium chloride, and 2 oz./gal. boric acid with an operating pH of about 5.8. This bath produces at low current densitites a very fine grained deposit which is easily buffed.

According to W. M. Phillips of the General Motors Corporation, the **Watts Type Nickel Bath** proved a very useful contribution in the progress of



Rubber-lined tank used for a large automatic bright nickel plating installation
(Photo courtesy Hanson-Van Winkle-Munning Co., Matawan, N. J.)



Typical heat exchangers used in maintaining the temperature of modern bright nickel plating solutions
(*Photo courtesy Heil Process Equipment Corp., Cleveland, Ohio*)

nickel plating. Given below is the original formula for the Watts bath:

	gm./l.	oz./gal.
$NiSO_4.7H_2O$	240	32
$NiCl_2.6H_2O$	20	3
H_3BO_3	20	3

One of the developments discussed by Mr. Phillips was the use of low pH nickel baths having the same formula as given above. A chart herewith, based on data obtained with plates of a thickness which is used a great deal in specification plating, namely 0.0005 inch, shows that good physical characteristics can be obtained when the relation between temperature and current density is controlled in a properly constituted bath. Thus, if the acidity of the bath is controlled at 2.5, there is increased solubility of the nickel anodes, and more successful operation of the bath in definite ranges of temperature and current density is assured.

The **Organic Type Bright Nickel Bath** was termed by Bernard Martin of the McGean Chemical Company to be essentially a Watts bath plus suitable organic addition agents plus an operator who will mind that certain requirements are met. The degree and type of brightness obtained detained depends upon the particular organic brighteners employed. A wetting agent is usually added to eliminate pitting. Hydrogen peroxide cannot be used in the organic bright nickel bath because of its adverse affect on the organic brighteners.

The bright nickel baths operate over a comparatively wide range of conditions; pH values range from as low as 2.0 up to 4.0, and sometime higher. The operating temperature is not critical. In general, the cathode current density range is broad. The optimum

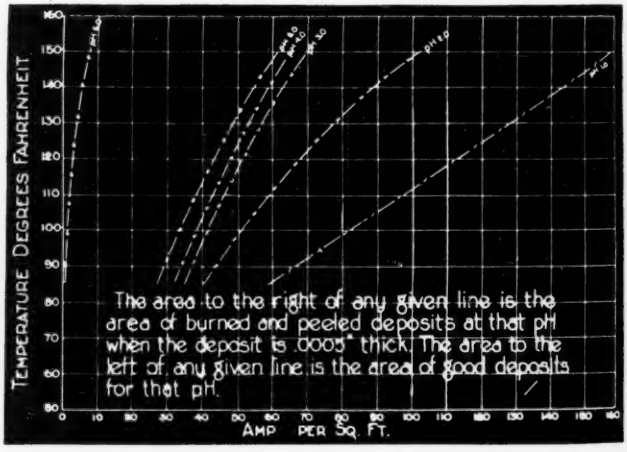

TEMPERATURE DEGREES FAHRENHEIT
AMP PER SQ. FT.
pH 2.0
pH 2.5
pH 3.0
pH 3.5
pH 4.0
The area to the right of any given line is the area of burned and peeled deposits at that pH when the deposit is .0005" thick. The area to the left of any given line is the area of good deposits for that pH.

Chart showing the effect of temperature, current density, and pH on the characteristics of 0.0005-inch thick nickel plates

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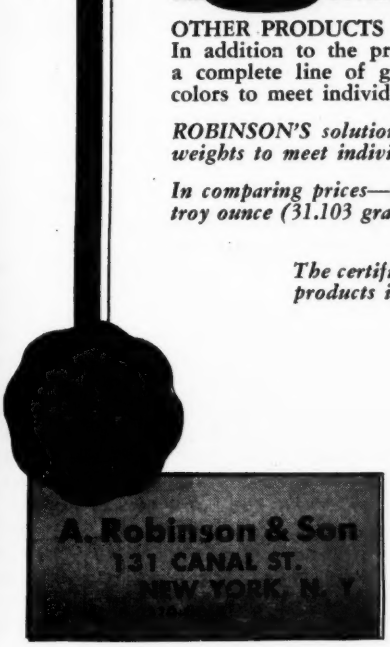

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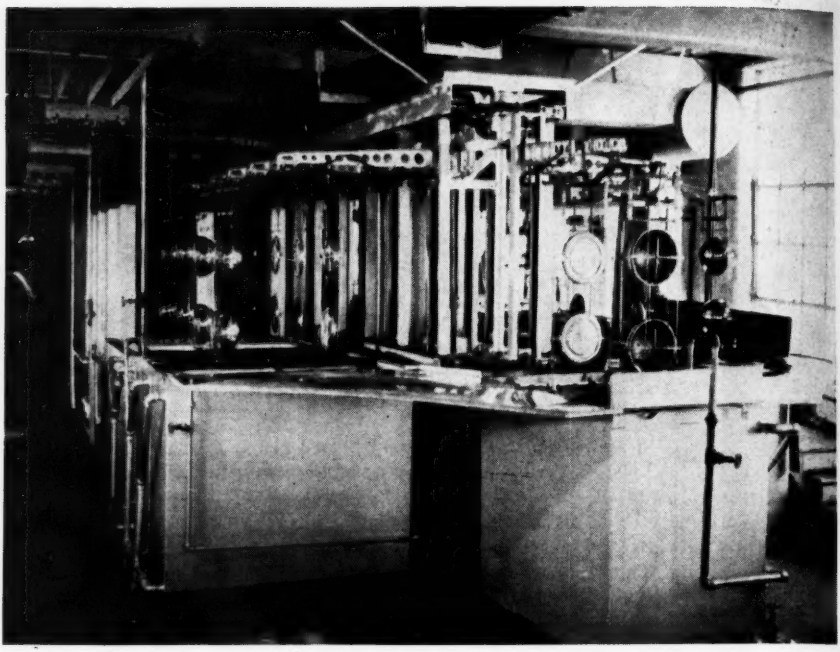

Automatic nickel plating installation
(Photo courtesy Hanson-Van Winkle-Munning Co., Matawan, N. J.)

value for operating conditions in a given bath will depend upon several factors, including the type of work being plated, agitation, rate of cathode movement, and rate of deposition. Once established, it is desirable that these values be maintained within narrow limits. Every effort should be made to prevent the contamination of the bath with impurities, both organic and inorganic. It is essential that high purity nickel anodes be used, and the anodes bagged to prevent anode sludge from getting in the bath.

All constituents of the bright nickel bath will require replenishing from time to time. The best practice for the production plater to follow is to make frequent small additions of brighteners rather than occasional large ones. Brighteners are usually added on the basis of the amount of work put through the tank. In addition, their concentrations are determined periodically by analyses. Additions of anti-pitting agents are usually governed by the appearance of the deposit.

In discussing **Alloy Type Nickel Baths,** M. B. Diggin of the Hanson-Van-Winkle Munning Company stated that cobalt-nickel deposits have been applied to almost every type of article on which nickel is plated. The objects plated vary in size from small watch parts to automobile bumper bars and tubular metal furniture. Among the plated products are, on the one hand, quality instruments such as microscopes, refractometers, and cystoscopes and, on the other hand, low cost merchandise, including kitchen tools or utensils and miscellaneous hardware items such as wrenches, toys,

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bathroom accessories, and so on. The 1 and 5 per cent cobalt-nickel alloy deposits are used extensively on brass plumbing goods, insignia, name plates, electrical appliances, roller skates, and bicycle parts.

Formulas for the most widely used nickel-cobalt process based on the Weisberg-Stoddard patent are given in Table I. Most commercial installations operate within a current density range of from 40 to 60 amp./sq. ft., although, according to Diggin's report,

	Type 9H	Type 5	Type AA
Constituents	**Concentration, oz/gal**		
Nickel sulphate	32.0	32.0	32.0
Nickel chloride	4.0	4.0	4.0
Cobalt sulphate	0.35	0.6	2.0
Boric acid	4.0	4.0	4.0
Ammonium sulphate	0.10	0.10	0.10
Formaldehyde	0.33	0.33	0.33
Nickel formate	6.0	6.0	6.0
	pH electrometric*		
For maximum brightness and throwing power	3.7	3.7	3.7
For semi-bright deposits of maximum softness and ductility	2.3	—	—

*Colorimetric values about 0.5 units higher.

Table I—Composition of cobalt-nickel baths

the range may be from 7 to 100 amp./sq. ft. The optimum bath temperature is between 140-160 deg. F. Special nickel-cobalt anodes are used to maintain the solution.

Based on recommendations of W. A. Wesley of the International Nickel Company in a discussion of the **All Chloride Nickel Baths,** there are types of work for which a bath containing no chlorides at all is the best, while other types of work make it advisable to employ an all-chloride bath. When freedom from nodules, high current densities and high throwing power are desired, the high chloride bath should be chosen. It has been used commercially in plating deposits 0.006 to 0.007 inch thick at 200 amp. sq. ft. It has also been reportedly used in a plant where steel furniture is plated in the daytime and salvage work done at night. There has been some use of the chloride baths in the deposition of heavy nickel deposits on plastics and on aluminum. However, it was pointed out by Wesley that where maximum ductility or freedom from stress is necessary chlorides should be kept as low as possible.

The simple all-chloride type bath is made up of 40 oz./gal. of nickel chloride and 4 oz./gal. of boric acid. The chloride bath has about twice the conductivity of the Watts type bath. Typical operating conditions are a pH of 2, temperature of 130 deg. F., and a cathode current density of 50 amp./sq. ft. All types of nickel anodes are reported to corrode in the chloride type bath with 100 per cent efficiency.

W. C. Pinner of the Houdaille-Hershey Corporation in discussing the combination of sulfate-chloride composition to produce **High Speed Nickel Baths** proposed a bath made up of 200 gm./l. nickel sulfate, 175 gm./l. nickel chloride, and 40 gm./l. boric acid. An operating pH of 1.5 and a temperature of 115 deg. F. was given as optimum. Organic brighteners of the type covered in the Brown Patent No. 2,191,813 were found to produce a bright plate within the above composition ranges.

One characteristic of this bath reported by Pinner, and which is of interest to the production metal finishing engineer, is that the high chloride concentration appears to suppress the formation of nodules in the plate. This is, of course, particularly advantageous in bright plating and appears to be characteristic of the high chloride, high speed bath, as distinguished from bright nickel solutions containing what is regarded as normal concentrations of chloride. The physical properties of the deposit appear to be equal to

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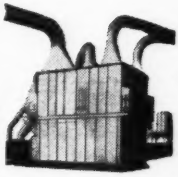
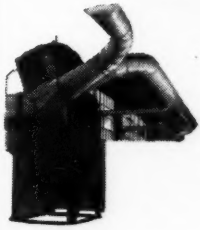


● Cloth screen filter used where clean, dry, returnable air is required.



● Rotoclone for wet process air cleaning, foundry shakeouts, etc.

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those obtained from any other organic type bright nickel solution.

* * *

Proper Attention to Primer Application Will Improve Quality of Finishes

THE production man in the finishing room should keep in mind the fact that a primer film does not necessarily have to be a thick film but it should be a continuous one. In most cases, a dry film thickness of one-half to three-quarters of a mil (0.001 in.) will suffice. Since the primer is the foundation of the entire finishing system, the method of application is important. Too many times the primer is applied carelessly, leaving parts of the surface untouched or scantily covered because the operator thinks it will not be visible after the metal object has been completely coated.

If the object in question is of an intricate shape, or if it has interior surfaces that are difficult to reach with a spray gun, it may be desirable to dip the primer, particularly if there is no chemical treatment of the metal surface and corrosion resistance depends on the primer alone. Most objects can be dipped provided they are not too large and do not contain depressions or pockets that will trap the paint. The dipped object should be hung so that the excess paint flows toward a given point or edge. A study of the contour of the part will generally reveal a way to suspend it that will ensure the optimum flow. Once having been established, the direction of flow should not be changed, since sags will result if the film is caused to reflow over itself after it is partly set up.

The question is often asked, "Why is it necessary to use a primer?" The answer is that it is often impossible to build into a single coat all of the properties that are desired in a finish.

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"RECTROL" Plating Rectifiers offer you the following advantages: • VARIABLE D.C. VOLTAGE—From zero to maximum available by rotating large knob located on front panel, and selected voltage is indicated on large (3½") D.C. Voltmeter. • ECONOMICAL TO OPERATE —Conservatively rated. Standard parts of best quality used. • CONSTRUCTION FEATURES are of custom-built quality, and include the following:—(a) Convection cooled, conservatively rated selenium rectifier . . . (b) Powerstat — continuously variable voltage control from zero to maximum... (c) DC Ammeter to indicate output current (size 3½") . . . (d) Voltmeter to read output DC Voltage (size 3½") . . . (e) Panel mounted fuse . . . (f) On and Off switch . . . (g) Pilot Lamp . . . (h) Rubber cord and Plug.

SPECIFICATIONS

Model	Input	Output	Capacity	Overall Size	Approx. Ship. Wt.
#101	115V., 60 cyc.	12V DC	25 amps.	10"x14"x11¾"	50 lbs.
#102	115V., 60 cyc.	12V DC	50 amps.	20"x14"x11¾"	75 lbs.
#103	115V., 60 cyc.	8V DC	150 amps.	28"x16"x13½"	150 lbs.

All models are continuously variable. Other Plating Rectifiers Made to Order!

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ELECTRO-TECH Equipment Co.

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FOR LONG, LASTING STRENGTH IT'S BUNATOL

● The elephant, known for its great strength, long life and tough but thoroughly flexible hide, typifies BUNATOL 785 plating rack insulation.

In decorative plating,—Nickel, Copper or Chrome,—rack and fixture insulation must take a lot of abuse from hot alkali cleaners, strong acid and alkali solutions and rough handling.

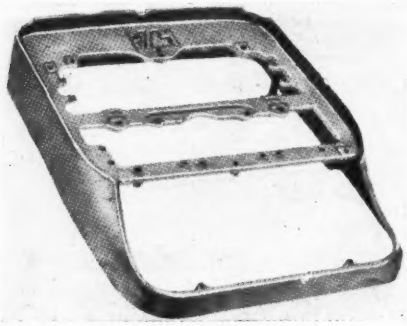
BUNATOL 785 is a heavy-bodied, free dripping liquid insulant that stands this abuse longer because it's tougher, yet more flexible. It can be applied (and patched when necessary) with less labor cost.

Let the generous sample that awaits your request prove that BUNATOL 785 can give you more and better production, lower costs and fewer rejects.

BUNATOL 785

NELSON J. QUINN CO., TOLEDO 7, OHIO

Primers are designed to give the maximum of adhesion to the surfaces on which they are applied, to provide the maximum of corrosion resistance, and, in some cases, to seal or fill any pores or other imperfections in the surface of the metal. Most primers contain corrosion-inhibiting pigments, such as zinc chromate and red lead, which immediately limit the range of possible colors to those which will tolerate considerable quantities of the yellow, red, or orange shades of these pigments. Furthermore, in the interests of adhesion of the final film, it is desirable to have low pigmentation and high binder solids, a combination which is not conducive to one-coat hiding, particularly in the case of white, ivory, or pastel colors. Frequently, the vehicles that provide the best adhesion and corrosion resistance are not the best for color retention and production of lasting gloss, or they may be so dark in color and have such a high staining power that the colors obtained are muddy and unattractive. Thus, it can be seen that a one-coat finish must be a compromise between adhesion and corrosion resistance on one hand and decorative effects on the other. There are undoubtedly a great many cases where such a compromise is entirely satisfactory. However, with a good primer properly applied next to the metal, the finisher is in position to use a wide choice of decorative top coats without adhesion and corrosion problems.



Aluminum die-cast typewriter frame which has been given a phosphate treatment prior to painting
(Photo courtesy Parker Rust Proof Co., Detroit, Mich.)

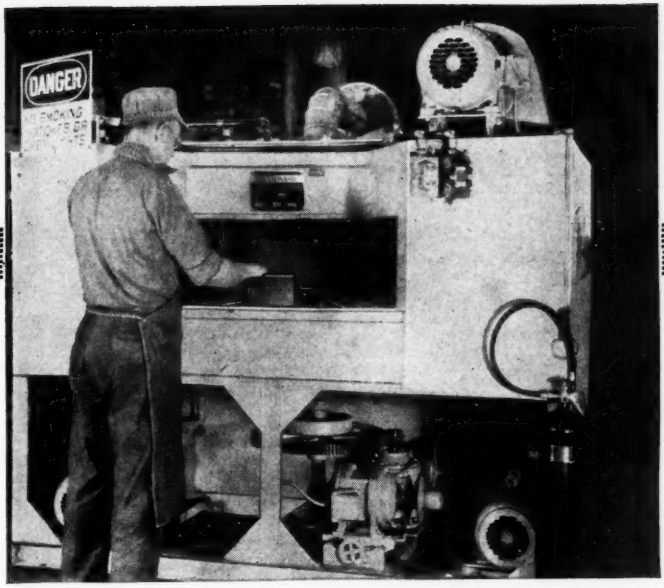
* * *

Treatment of Aluminum Surfaces for Improved Paint Adherence

THE phosphating of aluminum to promote paint adherence has come more in the foreground in the past few years. Untreated surfaces of aluminum and its alloys possess very little natural affinity for paint, lacquer, or enamel coatings. Due to the reactivity of the metal, such finishes will not adhere permanently, and often after a comparatively short time will flake and blister. Many methods to improve the durability of paint films on aluminum surfaces have been tried. Treatment with alkalis and acids may etch the surface and provide initial adherence of the film, but paint is still being applied to an active surface, and the subsequent penetration of small quantities of moisture through the paint film to the metal may result in difficulties in retaining adherence.

Although any attack on bare aluminum surfaces as a result of weathering is usually small and self-stopping because of the natural formation of oxide films, nevertheless, this small attack may be sufficient to loosen paint if allowed to spread. Phosphate coatings are reported to effectively prevent this spread of corrosion from any scratched or abraded areas. At the same time, due to its non-conducting nature, such coatings lessen or prevent spotty corrosion which tends to occur at isolated spots on the surface as a result of electrochemical action.

Bonderizing produces a phosphate type of coating on aluminum by a



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Washing - Rinsing - Blow-off

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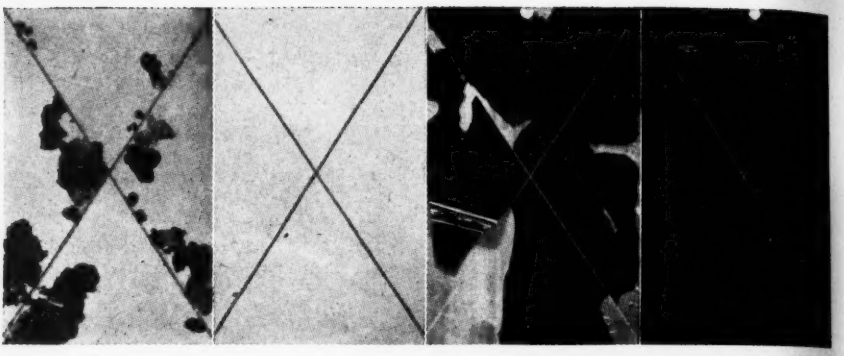
Always Specify METALWASH



Phosphate treatment of aluminum (Bonderizing) improves paint adhesion. (Left) Sheet aluminum painted without Bonderizing and tested in salt spray for 1,032 hours. Finish has failed. (Left Center) Sheet aluminum Bonderized and painted and tested in salt spray for 1,032 hours. Finish is still in good condition. (Right Center) Sheet aluminum painted without Bonderizing and tested in outdoor exposure for 3 months. Finish has failed. (Right) Sheet aluminum Bonderized and painted and tested in outdoor exposure for 3 months. Finish is still in good condition.

patented process developed by the Parker Rust Proof Company, Detroit. This method generally involves the treatment of aluminum in the following manner:

(1) Clean the work thoroughly by immersion in a mild inhibited alkali cleaner, by solvent or immersion cleaning, or by vapor degreasing.

(2) Immerse the cleaned metal in the Bonderizing solution, maintained at a temperature of about 160 deg. F. for 2 to 4 minutes. This converts the metal surface to a uniform phosphate coating. This processing solution is prepared by dissolving 10 gm. of boric acid and 12.5 gm. of sodium bifluoride per liter of water. Then 109 gm./l. of Bonderize make-up solution is added slowly with stirring.

(3) Rinse thoroughly in cold water for about 30 seconds immediately after Bonderizing.

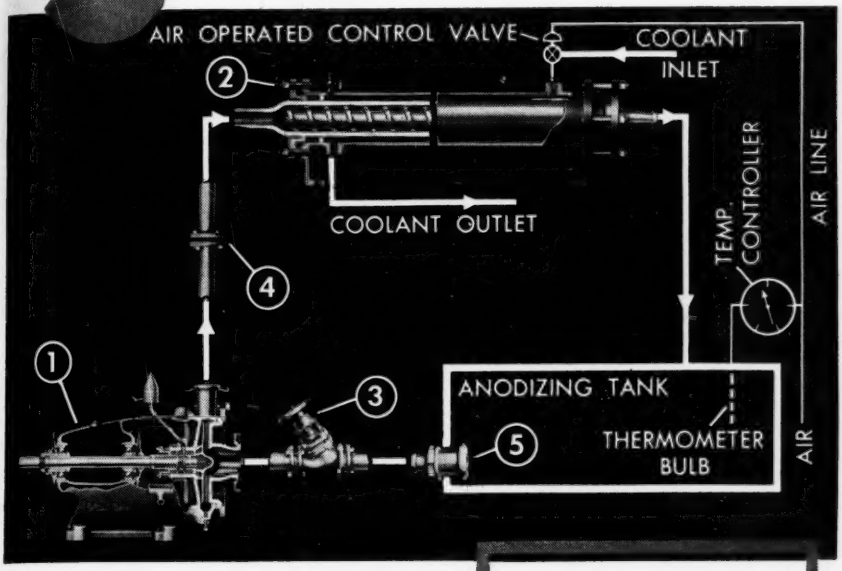
(4) Immediately after the water rinse, the work is rinsed for about 30 seconds in a dilute solution (0.6 gm./l). of chromic acid maintained at a temperature of about 108 deg. F.

(5) Dry the parts thoroughly prior to painting.

Another surface treatment for aluminum which has been designated as **Chromatizing,** is reported to produce a very thin, inert aluminum oxide film which tends to promote paint adhesion. The coating is intended essentially as a paint base and when used as such, it is reported to provide excellent corrosion resistance even when painted surfaces are abraded to the base metal. It also aids paint anchorage appreciably and tends to prevent paint film failure. This chemical treatment is given aluminum and its alloys by immersion in a 5 to 10 per cent solution of chromic acid maintained at a temperature of 140 to 150 deg. F. The work is left in the solution for about 5 minutes after which it is rinsed in cold water and dried.

Still another surface treatment, known as **Phosphatizing,** is similar to **Cromatizing** in that it forms a thin, inert phosphate coating on the metal. The chemical treatment is accomplished by immersing the work in a 5 to 10 per cent solution of phosphoric acid (75%) maintained at room temperature. The aluminum parts are

5 REASONS WHY THIS ANODIZING SET-UP STANDS UP AGAINST CORROSION



Five kinds of Durco equipment defend your anodizing installation against corrosive attack. This equipment is self-protected by the alloy of which each unit is made, Duriron.

Duriron is a Durco iron alloy containing approximately 14.5% silicon. This element gives it an extremely high resistance to sulfuric and chromic acid and to a wide range of other corrosives. Duriron's corrosion-defeating ability is permanent and uniform throughout.

Durco Adv. 26-GM

DURCO EQUIPMENT FOR ANODIZING

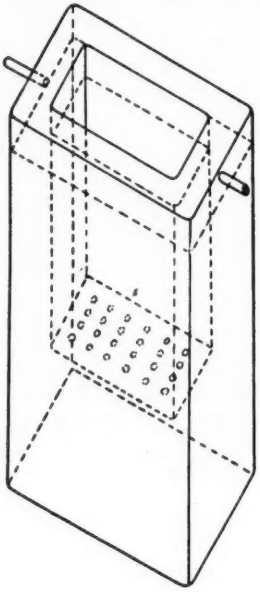
1. MODEL 40 DURCOPUMPS — With capacities up to 2000 GPM for heads up to 230 ft.
2. DURCO NO. 4 HEAT EXCHANGER —4C cooler, capacity 45,000 to 90,000 BTU per hour. Multiple units in either series or parallel arrangement, if additional capacity is required.
3. DURCO Y VALVES—Full opening with nearly straight flow.
4. DURCO SPLIT FLANGED PIPE AND FITTINGS—in sizes from 1" to 8" I.D. Larger diameters made to order.
5. DURCO TANK OUTLETS—For either thin or thick wall tanks and for flanged or lead pipe connections.

For complete information on all of the above types of Durco equipment ask for Bulletin Folder R.

DURCO
CORROSION-RESISTING ALLOYS & EQUIPMENT

THE DURIRON COMPANY, Inc.
DAYTON 1, OHIO, U.S.A.

left in the solution for about 5 minutes after which they are rinsed in cold water and dried. Both **Chromatizing** and **Phosphatizing** are used after mild alkaline cleaning to neutralize any alkali remaining on the aluminum surface and to prepare the surfaces for painting. Painting should be done as soon as possible after these



Panel degreasing apparatus
(Drawing courtesy "Canadian Chemistry and Process Industries")

treatments to avoid contamination of the metal.

* * *

Test Panel Cleaning Method

MOST finishing engineers will agree that in all paint, enamel and resin laboratories where test panels are made up there is a need for a simple and convenient method for panel cleaning. A simple piece of laboratory apparatus recently described by F. B. Parker and T. H. G. Michael, degreases test panels very efficiently ("Canadian Chemistry and Process Industries," Aug., 1946). Furthermore, it can be constructed from readily available materials at a cost of only a few cents.

The device, sketch of which is shown herewith, consists essentially of a small upper chamber, into which the panels are placed for cleaning, and a larger lower one in which trichlorethylene is boiled. The bottom of the upper chamber is perforated with a large number of holes through which the solvent vapor passes to reach the panels. These holes serve to return the condensed solvent to the lower chamber. At the top of the upper chamber is a water jacket which serves to condense any vapor which does not condense on the panel, thus preventing solvent loss.

The materials used in the construction of the panel cleaner consist of a square gallon can, which serves as the lower chamber, and a square quart can soldered inside the gallon can, which serves as the upper chamber. The water jacket is formed at the top of the device by soldering two pieces of light sheet metal a distance of one inch apart into the space between the quart and gallon cans. Two short lengths of copper tubing soldered as indicated serve as attachments for rubber tubing.

For use, about one liter of trichlorethylene is poured through the small upper chamber into the lower, the device placed on an electric hot plate, and water run through the jacket. The trichlorethylene vapor passes up through the holes, filling the working chamber, the excess being condensed by the water jacket. Panels are held with tongs in the vapor chamber until completely washed with condensed solvent, and on removal are ready for coating. This method completely removes all traces of oil and grease, and there is no time lost in waiting for the panels to dry since the solvent evap-

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WITH PRECIOUS METALS

We have been leaders in research and development in the plating field for many years, particularly in the realm of the precious metals. Our contributions to the advancement of this art have been notable—the development of the process for plating with rhodium is one outstanding instance.

Electro-plating with platinum, rhodium and gold for special applications, notably in electronics, radio, radar, telephone and other means of communication, often require research and experiment. Here is where our long experience and familiarity with the peculiarities of the precious metals will be of great value to you.

Among our precious metal products for the plater are:

Rhodium Plating Solution
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orates immediately from the hot panel. All fire hazard is eliminated by the use of non-burning trichlorethylene and solvent loss by evaporation is very small due to the effectiveness of the water jacket. Technicians in the finishing room will certainly want to investigate this helpful laboratory device in evaluation work with new finishing materials.

* * *

Water Dip Lacquers May Be Useful in the Finishing Room

WATER dip finishes or lacquers may find application in the finishing room for use on plated articles to afford some added resistance to rusting or to prevent tarnishing. They can also be used on steel or cast iron articles where a small amount of relatively inexpensive protection is desired. In either instance, the term "water dip" comes from the fact that the article to be finished need not be dried following the hot water rinse used in plating or cleaning. Thus, articles are lacquered while still wet with the final rinse, the water sinking to the bottom of the tank, without mixing with the lacquer.

Water dip lacquers were developed largely as a result of a need for a fast drying economical finish for cadmium and zinc plated parts during the war. Such finishes are applied to give a very thin final film which will penetrate between riveted sections and also permit ready soldering or spot welding. Water dip finishes, in general, do not interfere with electrical conductance and are valuable to prevent finger marking and staining on plated parts from oxidation due to elements in the atmosphere, such as sulfur compounds.

Water dip lacquers are composed of synthetic resins and suitable solvents. After the last rinse with clean hot water, following plating, the parts are immediately dipped in the lacquer. Parts are moved about in the lacquer to break any water spots on the metal and to allow better water drainage from parts that are of such shape as to trap water in pockets. The rack or individual parts are withdrawn, allowed to drain, and then air dried, or, to push production schedules, they may be force dried. Small parts that have been barrel plated may be dipped in a wire basket in the same manner; however, it is advisable to use a centrifuge on such parts after draining. Finishing engineers may wish to investigate this simple lacquer procedure to add an element of improved quality to finished parts, particularly plated parts which will be stored before assembly-line operations.

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Spray BOOTHCOTE on clean booth.
Paint peels off in sheets.
NO SCRAPING—SAVE TIME and LABOR
Trial offer 15 gals. $13.50 F.O.B. Buffalo
Used by 2000 leading manufacturers.
MONEY BACK IF NOT PLEASED.
Write for Circular.
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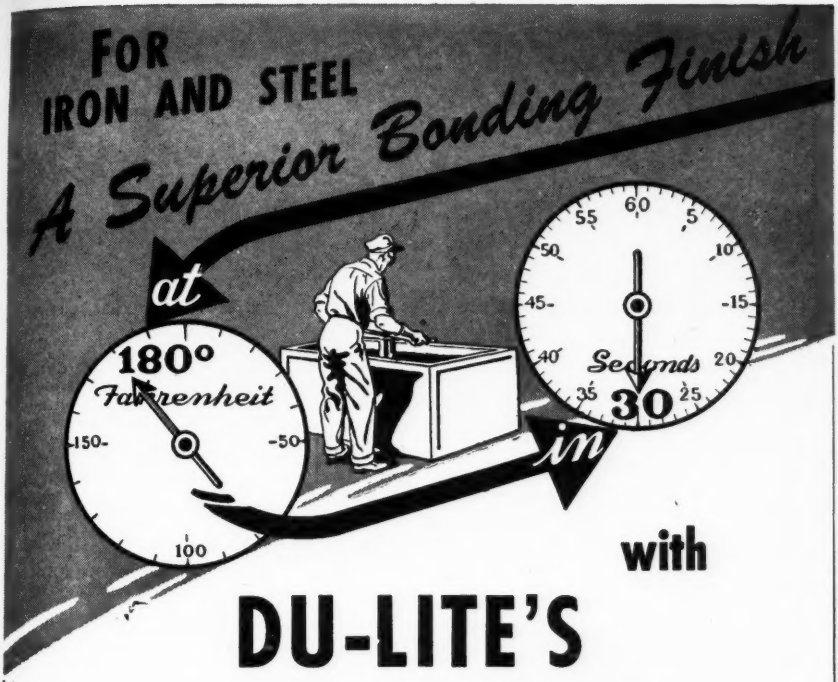
Corrosion Control Alkali Cleaners. A four-page illustrated technical data sheet on Neilco "Corrosion Control" Alkali Cleaners for ferrous metal has been prepared by Nielco Laboratories, 1632 W. Lafayette St., Detroit 16, Mich. Copy free upon request.



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New developments and recent refinements of the DU-LITE Phosteel Process have now made it possible to impose an excellent bonding finish on all shapes of iron and steel in 30 seconds at a Fahrenheit temperature of 180°. The new Phosteel retains its previous valued advantages:

LOWER COST—To Buy and Use
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MIDDLETOWN, CONNECTICUT

NEWS of the Industry

Receive Watches for Years of Service

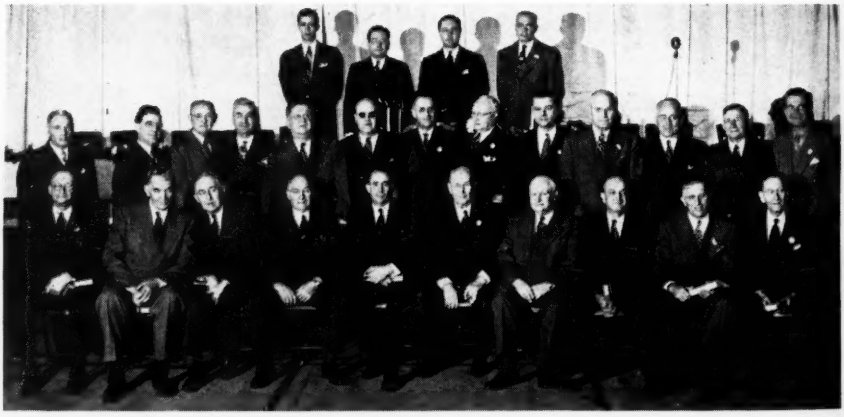
Twenty-five members of the Wyandotte Chemicals Corporation sales force (J. B. Ford Division) were recently awarded gold watches for completing 25 or more years of service. The watches were presented at a banquet at Wyandotte, Michigan, attended by nearly 500 company executives, research personnel, production workers, and salesmen.

Honored guests were the 25 J. B. Ford salesmen and 350 other Wyandotte Chemicals employees who had achieved their quarter century or more of service during the war years when civilian watches were not available. The combined service of the J. B. Ford Division men totals 724 years of Wyandotte experience.

Du Pont to Expand Titanium Plant

Plans for a new manufacturing unit at the Du Pont titanium dioxide plant at Edge Moor, Del., have been announced by the company's Pigments Department. Approval of the new project has already been obtained from the Civilian Production Administration. Much of the equipment to be installed cannot be procured except under long-term delivery, consequently, completion is not contemplated until sometime in 1948.

The Edge Moor plant manufactures titanium dioxide, a white pigment used in paints, lacquers, inks, and other materials. This plant also produces titanium calcium pigment which is used most widely in paints.



These Ford Division Wyandotte Chemicals Corporation salesmen were recently presented with gold watches for completing 25 or more years of service. Fifth from the left, front row, is Carter B. Robinson, Ford Division, vice president in charge of sales. Back row, left to right, are the following Wyandotte Chemicals Corporation officials: John Shallcross, assistant to vice president; William F. Torrey, vice president; E. M. Ford, president; Ford Ballantyne, secretary and treasurer.

Soday Becomes Devoe Research Director

The appointment of Frank J. Soday as research director at the Central Research and Product Development Laboratories of Devoe & Raynolds Co., Inc., is announced by Elliot Phillips, president. Mr. Soday's research and development work in organic chemistry has led to 100 patents being issued in his name, with applications pending on some 200 additional ones. These include developments on the production on some ethyl and isopropyl, alcohol, acetone and similar industrial solvents, as well as resins, plastics, and synthetic rubbers with important practical applications in the protective coating, leather, and textile finishing industries.

Frank J. Soday

Following his graduation from Grove City College in 1929 and post-graduate work at Ohio State, Mr. Soday has occupied important development and technical operating posts with the Monsanto Chemical Company and collaborated in the design, construction, and operation of plants for the production of resins and solvents from hydrocarbons.

Hogarth Named Pennsalt Purchase Engineer

According to an announcement by N. W. James, general purchasing agent, Barton I. Hogarth, graduate mechanical engineer, has been named to the newly-created position of purchase engineer in the equipment and supplies division of the Pennsylvania Salt Manufacturing Company purchasing department.

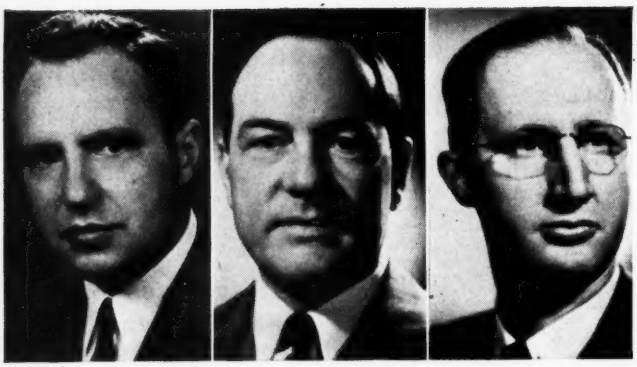
Mr. Hogarth came to Pennsalt from the Manhattan District Project. He was formerly associated with the Carbide and Carbon Chemical Company at its South Charleston, West Virginia, and Texas City, Texas plants. His work in the new division will be in connection with equipment and accessories.

Participated in Symposium on Radiant Heating

Paul H. Goodell, industrial heating engineer with The Trumbull Electric Manufacturing Co., Norwood, Ohio, participated in a symposium on radiant heating at the annual meeting of the American Society of Mechanical Engineers in New York on December 3. A registered Ohio engineer, Mr. Goodell is responsible for the development and installation of a large percentage of electric infra-red heating equipment in the country today. He received his technical education at the University of Cincinnati and is a member of the National Society of Professional Engineers, the Ohio Society of Professional Engineers, American Institute of Electrical Engineers, Illuminating Engineering Society, and the Engineering Societies of Cincinnati and Detroit.

Paul H. Goodell

Prior to his connection with The Trumbull Electric Manufacturing Company, Mr. Goodell was manager of the Industrial Heating Department of the C.M. Hall Lamp Company of Detroit.



(Left) Howard J. Morgens, (Center) W. Rowell Chase, (Right) A. N. Halverstadt

New Appointments in P & G Advertising Department

The Procter & Gamble Co., Cincinnati, Ohio, announces three new appointments in the management of its advertising department following upon the election of Neil H. McElroy to the position of vice president and general manager. Mr. McElroy was formerly in charge of general advertising.

Howard J. Morgens has been appointed manager of the advertising department, while W. Rowell Chase has been named manager of the brand development division of that department. A. N. Halverstadt has been appointed manager of the radio and media divisions.

American Wheelabrator Personnel Changes

Several changes in personnel have been recently announced by the American Wheelabrator & Equipment Co., 555 S. Byrkit St., Mishawaka, Ind. Ardee H. Freeman, district sales engineer for the Milwaukee territory, has returned to the Mishawaka office to become special project engineer. Mr. Freeman came to American Wheelabrator & Equipment Company in 1918 and has held a wide variety of positions in production, engineering, and research. For the past nine years he has been engaged in sales engineering, working at first out of the Mishawaka office, then out of Detroit, and finally, when the Milwaukee office was opened last year, he was assigned to that territory.

James H. Thomson has been appointed district sales engineer for the Milwaukee territory to replace Mr. Freeman. Prior to taking over the Milwaukee territory, Mr. Thomson, a graduate of Purdue University, handled sales engineering for Wheelabrator special cabinets and Airblast equipment in the Mishawaka office.

Edwin P. Clarke has been assigned to the Houston, Texas sales office where he succeeds Joseph F. Underway who has been transferred to St. Louis. A graduate of Miami University, Mr. Clarke joined the American Wheelabrator & Equipment Company after a three-year association with the U. S. Rubber Company where he was chief engineer of the fuel cell division in its Mishawaka plant.

Product Designer at New Location

Hans P. Nelson, prominent industrial designer, has established a new studio at 1510 Belle Plaine, Park Ridge, Ill. Mr. Nelson, who has a B.S. degree from Illinois Institute of Technology and has done graduate work in design at Northwestern University, has been associated with the product design field for the past 12 years, during which time he has styled and enginered many industrial and consumer products.

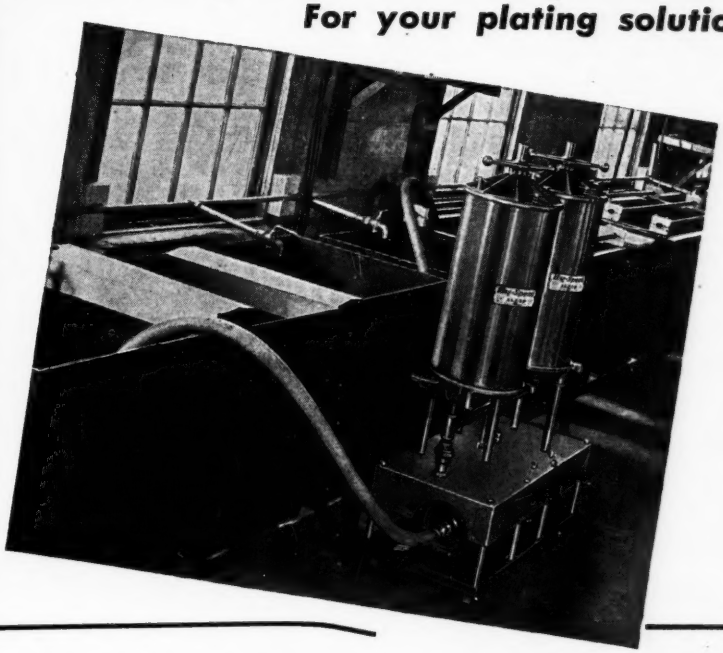
Heil Appoints Philadelphia Sales Representative

The Heil Process Equipment Corp., Cleveland, Ohio, announces the appointment of Richard A. Weppner as sales representative to cover the Philadelphia territory. Mr. Weppner will make his headquarters at 18 N. Lynwood Ave., Glenside, Pennsylvania.

A graduate chemical engineer and thoroughly familiar with chemical equipment problems, Mr. Weppner will handle Heil's line of process tanks, process tank heaters, and special tank linings.

HERE'S *positive* FILTRATION

For your plating solutions



The Alsop *"Sealed-Disc"* Filter completely eliminates most of your troubles, that is dirt, dust, oil and sludge, which in any solution are responsible for pitting, spotting, poor adhesion, formation of nodules, etc., which mean costly rejects and reworking. This unique filter removes all traces of impurities from plating solutions, yet will not effect brighteners.

This means more perfectly finished work with a saving of time and labor.

You'll find the *"Sealed-Disc"* Filter light, compact, portable and easy to move from one tank to another for instant use, though capable of handling as large a volume of solution as conventional filters many times their size.

"Sealed-Disc" units can also be used for many acid dips, electro cleaners, solvents and other general filtration work.

Above is a typical installation of a medium size twin unit which can be used with equal efficiency on tanks of many thousand gals. capacity or for maintaining the solutions in a number of small tanks in perfect operating condition. This compactness and extreme portability plus the ease and simplicity of cleaning make *"Sealed-Disc"* Filters supreme in their field.

Write for complete information or contact your regular plating supplier.

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B. H. Gardner Named Advertising and Sales Promotion Manager

The Chemical Corp., Springfield, Mass. announces that Bryant H. Gardner has joined its organization in the newly created post of advertising and sales promotion manager. Mr. Gardner came from Wm. B. Remington, Inc., where he was the account executive on the Chemical account. Prior to this he spent 14 years in the radio and advertising fields.

Expanded operations in the chemical specialty line and new products planned for early introduction made advisable the creation of a company advertising department. Besides a general line of heavy industrial chemicals, the corporation's principal products are Luster-on inhibited zinc bright dip, Stripode nickel stripping acid, Kemsuds industrial hand soap, Practi-Kreme and Kemglov skin protectors and cleaners, detergents and sanitary chemicals.

Named Turco Sales Chiefs

The appointment of L. H. Moulton to the post of national sales director and D. T. Buist to assistant national sales director is announced by Ray Sanders, vice president and general manager, Turco Products, Inc. Their headquarters will be the firm's main office in Los Angeles.

L. H. Moulton

Fifteen years of experience in the selling of Turco's broad chemical line affords Mr. Moulton excellent qualifications to direct the nationwide sales-service. staff. A graduate of Colorado College of Agriculture, Mr. Moulton was well known in the dairy and allied industries for many years, joining Turco in 1931. For the past eight years, he has directed Turco's Eastern Division from the Chicago plant office.

Mr. Buist joined Turco in 1936 as a specialist with 20 years' experience in the automotive field. Transferred to the Aviation Division in 1939, he was promoted to district sales manager in 1943, and western zone sales manager in 1944.

D. T. Buist

Resign from Du Pont Finance Committee

Irenee du Pont, former president, and H. G. Haskell, former vice president, of E. I. du Pont de Nemours & Company, have resigned from the Finance Committee of that organization, while J. Thompson Brown resigned from the company's executive committee and from his position as a vice president. All three men remain on the board of directors.

The two vacancies on the Finance Committee will be filled by Mr. Brown and Elwyn Evans, president of the Wilmington Trust Company and a Du Pont director. Mr. Brown's place on the Executive Committee will be occupied by Charles A. Cary, assistant general manager of the company's Rayon Department. Mr. Cary has been elected to membership on the board of directors, increasing its membership to 37, and has also been made a vice president. The board also announces that Lammot du Pont Copeland has been named as assistant secretary of the company.

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you sell equipment or supplies as listed below, it will pay you to use PRODUCTS FINISHING to present your sales message.

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Fire-Fighting Equipment
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Flocks
Generators
Gloves—Industrial
Grinders and Sanders
Infra-Red Equipment
Instruments—Recording
Lacquers
Lamps
Masking Tape
Metal Washing Equipment
Organic Coatings
Ovens—Baking
Paints
Polishing Machines
Rectifiers
Respirators
Rheostats
Rust Preventives
Solvents
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Spray Painting Equipment
Tack Rags
Tanks
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With over 17,000 monthly circulation, PRODUCTS FINISHING provides top-notch selective coverage of the largest buyer audience in the metal cleaning, plating, polishing and finishing industries.

Your advertising dollar will work hardest for you if you choose PRODUCTS FINISHING to carry your sales message.

Write us for advertising rates.

PRODUCTS FINISHING

431 MAIN STREET
CINCINNATI 2, OHIO

Dr. Joseph J. Mattiello (left) technical director and vice president of the Hilo Varnish Corporation discusses plans for a tour of the Hilo plant with Lucien Ravel while Pierre Bonnal looks on.

Hilo Varnish Hosts to French P & VA Members

A delegation of 17 members of the Paint & Varnish Association of France were guests recently of the Hilo Varnish Corporation where they visited the Brooklyn plant and attended a luncheon given in their honor. The invitation to study Hilo production methods had been extended the Frenchmen by Carl J. Schumann, president, and Dr. Joseph J. Mattiello, technical director and vice president of the Company, during the recent National Paint, Varnish & Lacquer Association Convention in Atlantic City.

The delegation headed by Lucien Ravel of the Pyrolac Company, France, was divided into small groups and conducted through the factory by Mr. Schumann, John Schumann, Dom Razzano, and Harry Stalzer. At the luncheon tendered to the visitors by Hilo at the Hotel Bossert, toasts were given toward cementing the already friendly relations existing.

Change in Trade Name

The Aluminum Company of America announces that after January 1, 1947 the alumina and fluoride products of the Aluminum Ore Company, an Alcoa subsidiary, will be marketed under the "Alcoa" trademark and trade name. The "Alorco" trade name and trademark, which for years have identified products of the Aluminum Ore Company, will be discontinued, and all merchandising will be conducted in the name of the Aluminum Company of America, Chemicals Division. The Aluminum Ore Company will continue the actual manufacture of the products.

The principal alumina products which will be sold under the "Alcoa" label include activated aluminas, tabular aluminas, hydrated aluminas, and calcined aluminas. The activated aluminas are used primarily as adsorbants and catalyst carrriers. Tabular aluminas and calcined aluminas are employed in the manufacture of ceramics, abrasives, and refractories. Hydrated aluminas find wide use as pigments for rubber, in glass and ceramics, and as a raw material in the production of aluminum chemicals.

The most important fluorides in the Alcoa line are sodium fluoride, sodium acid fluoride, and cryolite. These fluorides are used in the ceramic industry, in the field of metal finishes, and other fields.

Walter Huber Joins Sun Chemical Corporation

The Sun Chemical Corporation announces the appointment of Walter Huber as vice president of the General Printing Ink Division. A graduate of Cornell University where he majored in chemistry, Mr. Huber brings to his new position a well-rounded experience considerably broadened by technical development work during the last few years.

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PRODUCTS FINISHING

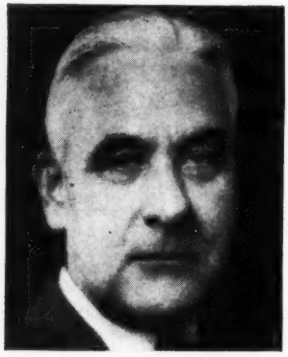
This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and The Advertising Council.

Grace Elected Pennsalt Director

Charles B. Grace, vice president and treasurer of the Heintz Manufacturing Company of Philadelphia, was elected a member of the board of directors of the Pennsylvania Salt Manufacturing Company at a recent meeting of the board. A graduate of Princeton University in 1928, Mr. Grace is also a director of the Girard Trust Company of Philadelphia.

Wedworth V. Baker Passes

Wedworth V. Baker, president of Detroit Sheet Metal Works, Detroit, Mich.,



Wedworth V. Baker

died Wednesday, December 11, 1946, in his home at 16803 Monte Vista.

A graduate of Michigan State College, Mr. Baker was a member of the Board of Commerce; Marlette Lodge No. 343; F. and A.M.; Palestine Chapter, R.A.M.; The Detroit Consistory, and the Moslem Temple.

Talks Presented by International Nickel Members

The employment of nickel plating to impart better corrosion resistance or abrasion resistance to engineering applications was discussed by E. J. Roehl, chemist, before a meeting of the American Electroplaters' Society at the Robert Treat Hotel, Newark, N. J., on Friday evening, December 6, 1946. In his talk, entitled "The Engineering Uses of Nickel Deposits," the use of heavy electroplated coatings for the salvage and repair of worn parts was described. The speaker also discussed methods of electroforming and some of the uses to which this process is applied.

Mr. Roehl is with the Development and Research Division of the International Nickel Company, Inc., at the company's Bayonne, New Jersey research laboratory.

Frank L. LaQue described and illustrated ways and mechanisms by which alloying elements can improve the corrosion resistance of irons and steels in a talk before the monthly meeting of the Boston Chapter of the American Society for Metals on Friday evening, December 6, 1946, at the Hotel Sheraton, Boston, Mass. He also discussed the specific effects of such elements as copper, nickel, phosphorus, chromium, and molybdenum with respect to corrosion of steels, including stainless steels, in several environments. The talk was illustrated with slides.

Mr. LaQue, well-known authority in the field of corrosion, is with the Development and Research Division of The International Nickel Company, Inc., at New York.

Industrial and Commercial Gas Conference at Boston

The A.G.A. Sales Conference on Industrial and Commercial Gas sponsored by the Industrial and Commercial Gas Section, American Gas Association, will be held at the Copley Plaza Hotel, Boston, March 17, 18, and 19, 1947, according to an announcement by Karl Emmerling, chairman, Industrial and Commercial Gas Section.

A program has been tentatively outlined by the Program Committee under the chairmanship of Harry A. Sutton, Public Service Electric & Gas Co., Newark, N. J. It has been planned to devote one day to a commercial session, one day to an industrial session, with one day in between to a combination of both and general subjects.

A reception to those attending the Conference will be sponsored by G.A.M.A. on Tuesday evening, March 18, the arrangements for this affair being in charge of Frank J. Fieser, F. J. Fieser Co.; Herman Gehnrich, Gehnrich & Gehnrich, Inc.; Harry O. King, Standard Gas Equipment Corp.; and Arthur Pitman, J. C. Pitman & Sons, Inc.

Du Pont Establishes New West Coast Offices

The establishment of two new Du Pont sales offices on the West Coast to cover the Los Angeles and San Francisco areas is announced by Dr. Joseph Shrawder, Jr., manager of West Coast sales for the company's Pigments Departments. The new offices will handle the distribution of white pigments and dry colors in California. Previously, these products were distributed through the C. L. Duncan Company of Los Angeles and San Francisco.

Dr. Shrawder, who has recently been placed in charge of West Coast sales, will make his headquarters in Pasadena. The Pasadena office, covering the Los Angeles area, will be managed by Wilbur S. Johnson, formerly Los Angeles manager for the C. L. Duncan Company. Associated with him as sales representative will be Bodine B. Barrett, formerly production supervisor at the Newark pigments plant.

George B. McCrea will be manager of the San Francisco office. Prior to the war, Mr. McCrea was a pigment sales representative in Chicago. James S. Martin, formerly with the C. L. Duncan Company, will be associated with Mr. McCrea as sales representative.

The Los Angeles sales area office will be located in the Security Building, 234 E. Colorado St., Pasadena 1, Calif. In San Francisco, the new Du Pont office will be located in the Merchants Exchange Building, 465 California Street.

Clarence H. Sample Joins International Nickel

Clarence H. Sample, formerly chief engineer of Rheem Research Products, Inc., has joined the electroplating section of the Nickel Sales Department of The International Nickel Co., Inc. He will make his headquarters at New York and will work on the development and sales of nickel plating.

Mr. Sample has a B.S. degree in chemical engineering from the University of Idaho and an M.A. in chemistry from Columbia University. From 1930 until 1945 he was on the technical staff of the Bell Telephone Laboratories, Inc., New York, where his duties included research and development on corrosion and metallic finishes.

Mr. Sample is a member of the American Society for Metals, the American Chemical Society and The Electrochemical Society. He is also active on several committees of the American Society for Testing Materials, in which he is currently secretary of Committee B8, Electrodeposited Metallic Coatings.

Symposium on Paint

During Committee Week of the American Society for Testing Materials, to be held in Philadelphia February 24 to 28 inclusive, a Symposium on Paint with a number of technical papers will feature the Spring Meeting of the Society. The Symposium on Paint is being arranged by Technical Committee D-1 on Paint, Varnish, Lacquer and Related Products, with the cooperation of the Philadelphia District of the Society.

Three general subjects will be covered by a series of technical papers. On the morning of Tuesday, February 25, "Methods of Evaluating of Paints" will be discussed, the finishes to be covered including those used in industrial, automotive, container, and marine applications. In the afternoon session, three leading technologists will discuss the "Evaluation of Paint Materials," topics including the Application of Infra-Red Absorption Spectra to Drying Oils, the Use of Inclined Tube Viscometer, and the Application of the Stroboscopic Timer for Stormer Viscometer. Also scheduled for the afternoon session is a discussion of Statistical Analysis of Paint Test Data, in which several speakers who have devoted much time and study to the use of statistical analysis and quality control methods will cover a General Introduction, Application of Statistical Methods, and the Analysis of Paint Exposure Data.

Leading off the symposium in the morning will be an address by John C. Moore, president of the Federation of Paint and Varnish Production Clubs and an active member of Committee D-1, on the subject "Test Methods and the Paint Industry." All sessions will be held at the Benjamin Franklin Hotel.

"Secret of Sol-Speedi-Dri Leadership" is the title of a six-page folder now being distributed by the Waverly Petroleum Products Co., Drexel, Bldg., Philadelphia 6, Pa. The folder contains specific facts and pictures regarding the various steps involved in the production of Sol-Speedi-Dri absorbent for industrial housekeeping. Copy free upon request.

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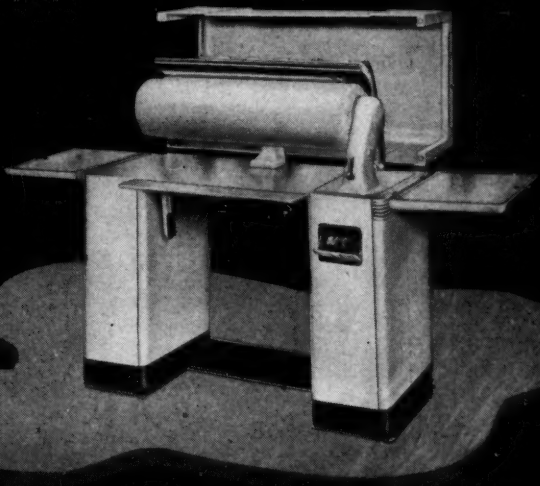
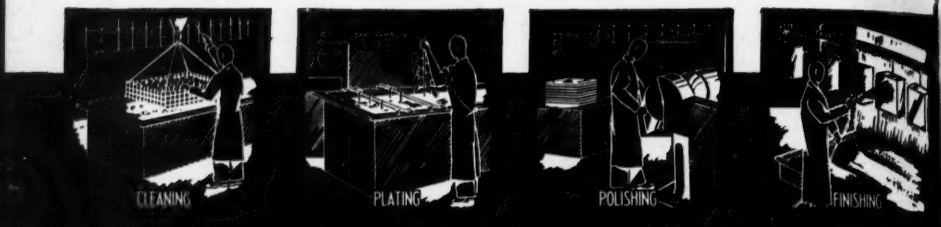
that aid
in appearance
and utility



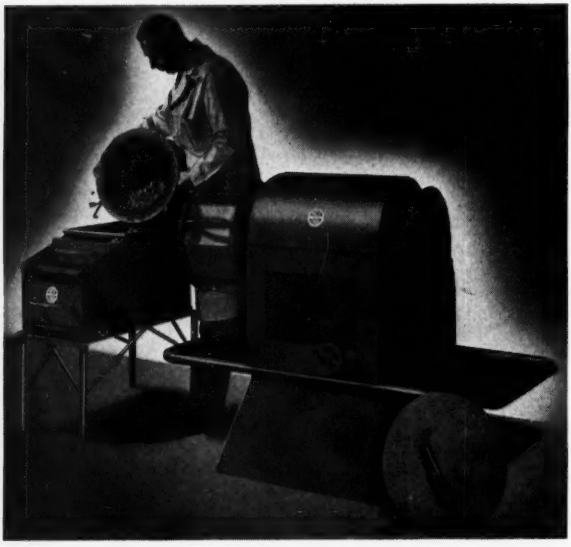


Roto-Finish Midget Machine

Designed to effect time and labor economies in the mechanical finishing and deburring of very small parts in both large and small quantities, the Roto-Finish Midget Machine shown herewith has been brought out by The Sturgis Products Co., Sturgis, Mich. The cylinder of the machine is 8 inches wide x 12 inches across the flats, and has a variable drive of 35 to 70 r.p.m. The flats are lined with kiln dried hard maple and the ends are rubber sealed. A cover is fastened to the cylinder, which is mounted on the machine by a unique lock and adjustable clamp that allows for quick loading and unloading.

The machine can be supplied without a base for bench mounting, together with hand parts separator having a drain connection. Interchangeable screens for the separation of chips from parts are available in all mesh sizes.

The Roto-Finish Midget Machine is recommended for installation in small plating shops, manufacturing plants with small finishing departments, and plants engaged in finishing only very small parts. Finishing operations which may be performed in the machine include grinding, deburring, polishing, Britehoning, and coloring. The controlled rotary action of the wet mixture of midget chips and compound produces a surface suitable for plating by uniformly removing burrs, sharp edges, and corners on small stampings, machined parts, and die castings, the manufacturer states.



Roto-Finish Midget Machine

"Dustex" Dust Collector

"Dustex" Dust Collector

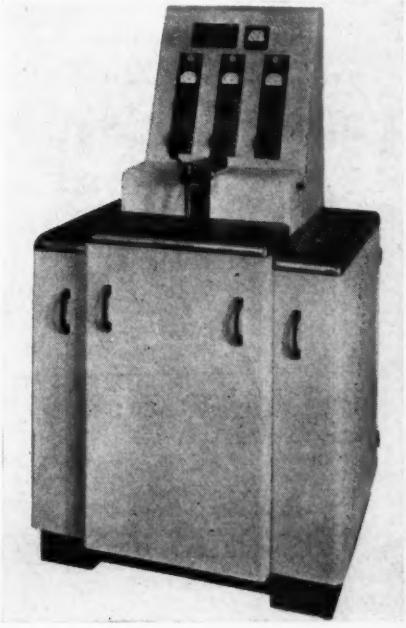
Arranged to provide for separation of a high percentage of the dust at the point of intake, the "Dustex" Dust Collector illustrated herewith has been introduced by the Dust Filter Co., 1753 W. Lake St., Chicago 12, Ill. A specially designed baffle plate located beneath the filter tubes of the unit causes a rotation of the air and dust in a cyclone manner into the retaining pan at the bottom of the collector, thus resulting in a deposit of the dust at that point before it has an opportunity to reach the filter tubes. Consequently, no heavy dust or lint is said to reach the fifteen 36-inch long filter tubes at the top of the unit. All remaining fine dust is collected in the tubes.

Said to require a minimum of maintenance, the Dustex Dust Collector has a static pressure of 6½ inches which is maintained constantly. The unit is availbale in one size only, measuring 4 feet high and approximately 2 feet square. Recommended for use in connection with buffing, polishing, and grinding machines, although readily adaptable to other equipment, the collector is equipped with a 1½ h.p., 2-phase, 220-440 volt motor and is designed to handle two 4-inch branch pipes.

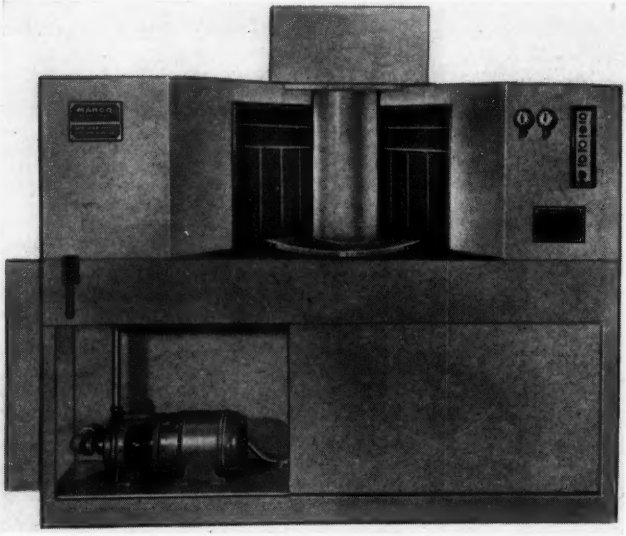
Cenco-Hangosky Electropolisher

Product of the Central Scientific Co., 1700 Irving Park Rd., Chicago 13, Ill., the Cenco-Hangosky Electropolisher illustrated herewith is designed to speed the polishing and etching of metallurgical specimens. With the unit, properly polished and etched samples can be easily prepared from such substances as low and high carbon steels, plain carbon and stainless steels and most of the other complex alloys containing small amounts of iron, cast steels, cast irons, nickel and nickel alloys, bearing metals, copper, brass, aluminum, zinc, cadmium, and many other metals and alloys. Inclusions are retained and may be identified.

The apparatus is completely self-contained and is housed in an attractive metal cabinet with inclined control panel containing knobs and meters for the control of polishing and etching time and current. A water fountain is provided for cooling and washing the sample, and connections can be made to city water and drain pipes. The unit requires either 115 or 230 volts, 60-cycle a.c. for operation. The maximum power require-



Cenco-Hangosky Electropolisher



Mabor Turn-Table Washing Machine

ment is 3 kilovolt amperes.

One charge of electrolyte solution is supplied with the instrument. The solution regularly furnished is suitable for the polishing and etching of practically all ferrous and many non-ferrous alloys. Another solution for non-ferrous metals, including copper and brass, is available upon request.

Mabor Turn-Table Washing Machine

The Mabor Co., Clark Township, Rahway, N. J., has produced a turn-table type washer which is designed to both rinse and dry average size parts in baskets, trays, or individually. The unit is said to require only one operator to load and unload the parts for cleaning. In addition, the washer, according to the manufacturer, is completely self-contained, compact, efficient, and requires little floor space in which to achieve an average production of 60 baskets per hour. Basket dimensions are 12 x 12, 16 x 16, or 20 x 20 inches, and the load capacity is 1,800, 2,500, or 3,000 lb., according to the size of the machine.

The Mabor Turn-Table Washer is available in three standard sizes and may also be obtained with special modifications for difficult and unusual problems where centering of parts is essential. It may be heated by steam, gas, oil, or electricity.

GOLD PLATING SOLUTIONS

In All Colors

Guaranteed 100% Pure Gold Content
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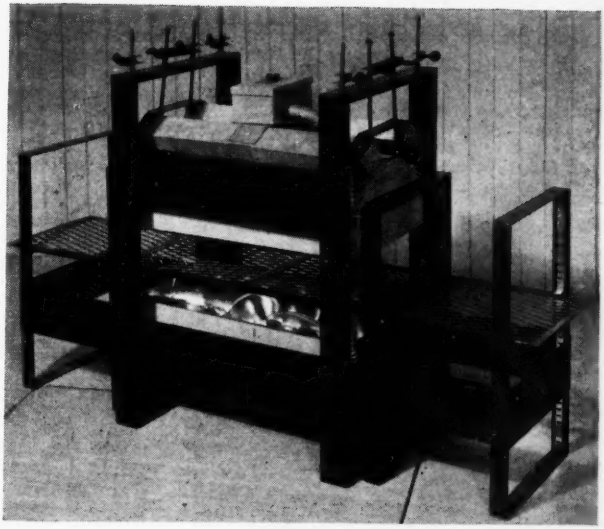
Miskella No. 525 Infra-Tray-Veyor

An improved model of its Infra-Tray-Veyor for drying, preheating, baking processing, and heat treating parts and materials is announced by The Miskella Infra-Red Co., E. 73rd and Grand Aves., Cleveland 4, Ohio. Designated as the No. 525, the unit is standardly wired for 230 volts and is equipped with sealed-in reflector-type 250-watt Mazda lamps.

The design of the No. 525 includes four expanded metal trays, each measuring 11 x 11 inches, and insulated-reflective heat units suspended with two sets of four combination lamp-saver shock absorbers. The faces of the heat units each measure 11 x 22 inches, and the widest opening between heat units is 10 inches, the opening being readily adjustable to suit requirements. Eight lamps having a total load of 2,000 watts are provided, the lamps being controlled by means of

Miskella No. 525 Infra-Tray-Veyor



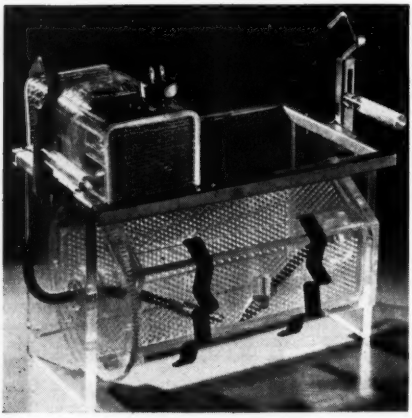
four switches for aiding in establishing the heat setting. If desired, one-half of the Infra - Tray - Veyor may be used only, in which case the total load is 1,000 watts.

The Miskella No. 525 Infra - Tray - Veyor measures 28 inches high x 15 inches wide x 48 inches long and has a shipping weight of 90 lb. It can also be obtained in larger sizes, including closed-in sides. A Powerstat auto-transformer for temperature control can be supplied as extra equipment. Also available for the unit is a bench-truck measuring 28 inches high x 24 inches wide x 44 inches long and having a top and shelf made of ¾-inch plywood. The front of the truck is equipped with ball bearing casters.

"Lucite" Plating Barrel

Used for metal plating by the tumbling method, a plating barrel made of Du Pont "Lucite" acrylic resin is now being marketed by the Hardwood Line Co., 540 N. Artesian Ave., Chicago, Ill. Objects to be plated are held in a perforated container which is dipped and revolved in a vat containing the plating solution.

The barrel is hexagonal and mounted on a moving stand which allows the machine, gears and all, to be lowered into the solution vat. The gears are constructed of Lucite, as well as the barrel itself, thus making the complete unit resistant to the acid used in the plating bath.



"Lucite" Plating Barrel

Designed to withstand severe usage and to allow for easy loading and unloading, the Lucite Plating Barrel is of one-piece construction, the ends of the barrel being cemented to the sidewalls. The loading door is a tightly-fitting single sliding panel which forms one of the sides of the hexagon.

ALLWOOD

"Vienna Brand" Lime

Made from Limestone that is identical in chemical analysis and geological structure with European Imported Lime. Tests show a "lime cake" made from Allwood "Vienna Brand" Lime equals the finish made from imported lime.

WRITE FOR FULL PARTICULARS

ALLWOOD LIME COMPANY

Manitowoc • Wisconsin

Korolac RX-2500

Said to embody the well-known chemical inertness of Koroseal tank lining, a solution for the coating of electroplating and pickling racks, to be known as Korolac RX-2500, has been developed by The B. F. Goodrich Co., Akron, Ohio.

A second new development, known as Korolac Primer No. A-208-B, is used in conjunction with Korolac RX-2500 to provide for adhesion of the Korolac coating to the metal rack. This primer is brushed onto the rack and areas adjacent to the contact points, thereby preventing contamination of plating baths by carry-over of solutions underneath the protective rack coating.

Korolac RX-2500 is white, opaque, and glossy. Hot alcoholic reverse current cleaners and such oxidizing acids as chromic and 40 per cent nitric are said to have a little or no effect on the coating. The resistance to organic solvent cleaners is also described as being unusually good.

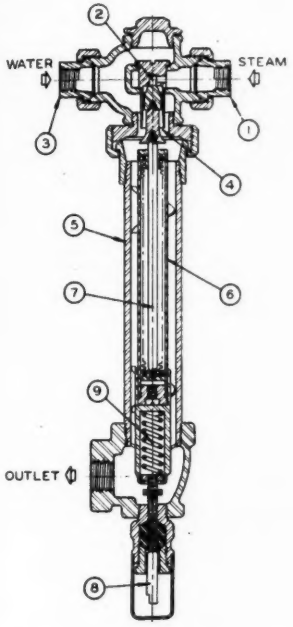
Sarco Steam and Water Mixer

To provide hot water at remote points for showers and wash basins in industrial plants, the Sarco Co., Inc., 475 Fifth Ave., New York 17, N. Y., has brought out a streamline steam and water mixer which can be readily tapped into a steam pipe, thus eliminating the necessity of piping hot water long distances or installing separate water heaters and temperature regulators at isolated points. According to the manufacturer, the smallest washroom can easily house the steam and water mixer which measures 26 inches in length x 5 inches in width at the head.

A thermostat, built-in and Sarco liquid-filled, is said to ensure automatic, sensitive control, as set by a key. With an unusually large capacity for hot water, the mixer is of foolproof construction and is carefully designed and precision made to obviate annoying shutdowns, it is claimed.

Referring to the accompanying illustration, steam enters the mixer at opening (1) and passes through valve (2).

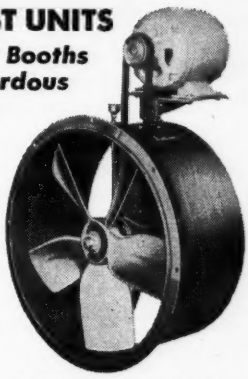
Cold water enters at opening (3) and mixes with the steam in injection chamber (4). The resulting mixture of hot water enters housing (5) and flows over thermostat (6) which is filled with Sarco liquid and hermetically sealed. When the hot water flows over it, this liquid expands, gradually pushing forward plunger (7) to close valve (2) and to cut steam at the temperature set at opening (8) by a key furnished. Body (5) then cools by radiation, liquid in thermostat (6) contracts, and plunger head (7) opens valve (2). In operation, a balance is secured which holds the valve open sufficiently to maintain the desired temperature. Release spring (9) prevents damage from accidental overheating.



Cross-Sectional Drawing of Sarco Steam and Water Mixer

The Sarco Steam and Water Mixer is principally constructed of brass, with renewable valve heads and seats of stainless steel. Union connections are provided on steam and water inlets. The maximum steam pressure which can be handled is 125 p.s.i.g. Steam pressure must be 20 per cent higher than the water pressure.

EXHAUST UNITS
for Spray Booths and Hazardous Locations



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Also Manufacturers of a complete line of waterwash and dry type paint spray booths with accessories. *Send for details.*

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• Better Finishing
• Lower Cost

Especially designed for high speed cylindrical work, "PRODUCTION" MODEL 101 centerless feed polishing machine produces better finishing at lower cost. It feeds automatically without centering, chucking or holding. All parts are guarded and readily accessible for changing the wheel. The construction is rigid and durable throughout. Any desired finish on rods, tubes or bars, 1/4" to 6" in diameter.

Production Machine Co.
Greenfield • Mass.

Kidde 5-Pound Fire Extinguisher

Kidde 5-Pound Fire Extinguisher

A fire extinguisher containing 5 pounds of fire-killing carbon dioxide in a recently developed lightweight cylinder is now under production by Walter Kidde & Co., Inc., Belleville, N. J. The new portable replaces the old 4-pound type, giving an extra pound of carbon dioxide while reducing the average charged weight by 2½ pounds. The 4-pound portable weighed 18 pounds, whereas the new 5-pounder weighs 15½ pounds.

According to the manufacturer, the increased carbon dioxide content of the Kidde 5-Pound Fire Extinguisher provides added protection to small hazard areas. With the extra pound of carbon dioxide, fires can be attacked with a greater safety factor, and easier handling has been made possible by the reduction in weight.

Other portables are available in 2½, 10, 15, and 20-pound sizes, and wheeled units in 50, 75, and 100-pound sizes. All sizes of Kidde extinguishers are approved by both the Underwriters' and Factory Mutual Laboratories for flammable liquid and electrical fires.

Trumbull Type D Enclosed Safety Switch

An enclosed safety switch designated as the Type D is now being produced by The Trumbull Electric Manufacturing Co., Plainville, Conn. The switch is rated at 30 amperes and is compactly contained in a box measuring 4½ inches wide x 6⅛ inches long x 3¼ inches deep. A uniquely designed handle allows for front operation of the Type D, a triple duty spring being attached to the handle to take up any loose tolerance in the switch. The spring also provides a flexible connection to movable contacts, as well as a seal between the handle and cover.

The Trumbull Type D Safety Switch is constructed so that the pivoting lever may be padlocked in the "off" position to prevent opening of the switch or cover by an unauthorized person. The design includes an abundance of wiring room and easy-to-get-at terminals. The entire switch mechanism is mounted on the back of the box and may be removed by loosening a single screw.

Trumbull Type D Enclosed Safety Switch

For a real good polishing job use

KEYSTONE EMERY

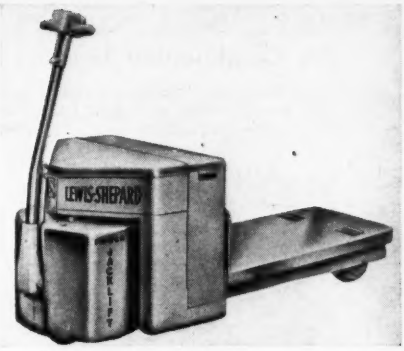
TURKISH — NAXOS — AMERICAN

KEYSTONE EMERY MILLS *Write for Sample* 4316 Paul St., Phila., Pa.

The Trumbull Type D Enclosed Safety Switch is available in the following capacities: 2-pole, 125 volts; 3-pole solid neutral, 125/250 volts; 3-pole solid neutral with meter twist-out, 125/250 volts; and 3-pole solid neutral, 125/250, 230 volts, alternating current.

Lewis-Shepard Power Jacklift

Vertical handle operation and electric braking are features of the Lewis-Shepard Power Jacklift now being manufactured by Lewis-Shepard Products, Inc., 248 Walnut St., Watertown 72, Mass. Available in both platform and pallet models, the unit is described as an electrically-operated hand lift truck with complete electric push-button control from the handle head. Every operation of the truck can be controlled with the handle in a vertical position. Upon release of the handle by the operator, a positive smooth-action brake is applied which instantly stops the motion of the truck. In the vertical position or when lowered, the handle has a steering arc of 200 deg., thus allowing for accurate loading, lifting, traveling, lowering. and spotting of loads under all conditions.



Lewis-Shepard Platform Model Power Jacklift

The Lewis-Shepard Power Jacklift is driven by means of an electric master drive unit that is readily replaceable. With the gear drive and all wheels mounted on ball bearings, totally enclosed and packed in grease, smooth, dependable operation is said to be assured. The truck is available in several lengths, ing, lifting, traveling, lowering, and in both wide and narrow designs.

"You see the SAVING, in using Precision Protectors instead of any old paper or rag that comes in hand!"

PRECISION

Dust Caps & Thread Protectors

Specially designed to protect exposed openings, ends, coil forms, etc., from moisture, oil, dust, rust, grit, in transit or storage.

Shapes to fit all small parts.

External or internal. Strong, spirally wound fibre seals, applied in a jiffy *because they fit.*

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AMBER FLAKES
for efficient, economical
METAL BURNISHING!

Good lubricating properties... good "body" . . . ready solubility . . . these are the essential qualifications of a soap for metal burnishing. And Amber Flakes meets all of these qualifications generously.

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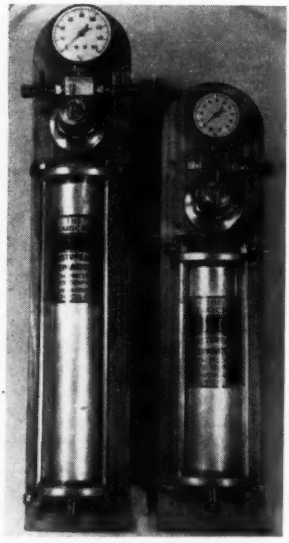
Willard C. Beach "Sta-Dri" Air Conditioning Unit

Designed to screen out scale, rust, and dirt from compressed air pipe lines, as well as to extract moisture and oil fumes



Willard C. Beach "Sta-Dri" Air Conditioning Units

and to regulate air pressures to any desired lower level, an air conditioning unit to be known as the Willard C. Beach "Sta-Dri" is now being marketed by the Beach Precision Parts Co., 120 Mechanic St., Boonton, N. J. Constructed for long trouble-free operation, the unit is ruggedly constructed and is said to be capable of delivering absolutely clean dry air with a minimum of frictional line drop.

Incorporating a gage which indicates final pressure used, the unit is available in two models; namely, Model A-1 Junior for handling approximately 30 cubic feet of air per minute at 100 lb. pressure, and Model A-2 Senior for handling approximately 65 cubic feet of air per minute at 100 lb. pressure. The Model A-1 Junior is supplied complete with one extra Sta-Dri filter and has a shipping weight of 14 lb. The Model A-2 Senior is supplied with two extra Sta-Dri filters and has a shipping weight of 16 lb. Both models are panel mounted for convenient installation.

According to the manufacturer, the Willard C. Beach Sta-Dri Air Conditioning Unit is useful in connection with air lines for spray guns, chipping tools, small riveters, air hammers, grinders, and similar pneumatic tools.

"Platin-Nig"

"Platin-Nig," a solution for quickly and easily producing a rich oxidized or "antiqued" effect on sterling and silverplated products without the use of electric current, is announced by the Hanson-Van Winkle-Munning Co., Matawan, New Jersey.

In using Platin-Nig, the work is simply immersed in the solution, prepared according to simple directions, and then highlighted for striking light-and-shadow relief. The "quality look" of silver products is said to be heightened as a result of the use of Platin-Nig.

W-S "Vinylite" Finishes

A group of high solids finishes combining the resistance of "Vinylite" plastics and the adhesion, depth, gloss, and workability of synthetics is now being manufactured by The Watson-Standard Co., Pittsburgh 12, Pa. Available in both clear and brilliant colors, the finishes are prescription compounded and can be applied with any method of metal product finishing either before or after fabrication.

According to the manufacturer, the W-S Vinylite Finishes are applicable to the complete family of metals, both ferrous and non-ferrous, and are adaptable to baking, producing brilliant coatings that possess outstanding durability on interior and exterior surfaces.

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SOLVENTS and THINNERS
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"Gripmaster" Improved Polishing Wheel Cement

A new technical advance in "Gripmaster" Polishing Wheel Cement that has the effect of locking out humidity has been announced by the Gripmaster Division, Nelson Chemicals Corp., 12345 Shaefer Highway, Detroit 27, Mich. The cement now contains a special ingredient that is said to actually fortify it against moisture in the air, thus affording polishers, a "vise-tight" adhesion action in every kind of weather.

According to the manufacturer, an important time-saving and inventory-reducing advantage of Gripmaster Improved Polishing Wheel Cement is that all grains—250 to 20—may be applied with but one grade of cement, thereby eliminating the necessity of stocking several different grades of adhesives for different metals, different flexibilities, or different temperatures. To enable polishing plant executives and superintendents to test Gripmaster on their own jobs, a generous sample of the material is being offered free to such individuals addressing requests on their company letterheads.

Trioxane

E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del., announces that trioxane, a polymer of formaldehyde useful as a fuel, solvent, plasticizer, intermediate in organic reaction processes, and for a wide variety of industrial purposes is now available for commercial distribution. The product is a colorless, plastic, crystalline solid having a sweet odor and is said to ignite instantly with a very hot, non-luminous, clean, odorless flame.

Readily soluble in alcohols, ketones, ethers, esters, chlorinated hydrocarbon solvents, and aromatic hydrocarbon solvents, trioxane, in the molten state, is itself claimed to be an excellent solvent for many organic substances, including phenol, naphthalene, fatty acid amides, and urea. It is soluble in most types of organic materials, making possible the use of trioxane as an intermediate in organic reaction media. In such anhydrous media, trioxane is stable if the system is neutral or alkaline. Small amounts of strong acids or acid-forming substances cause the compound to depolymerize to monomeric formaldehyde at a rate that may be readily controlled by regulating the amount of catalyst and the temperature.

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"Liquid Sulphur"

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- Has long life in solution.
- Gives chemical control of your oxidizing solution.

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Haverhill, Mass.

New Literature

Harshaw Modified XXX Bright Nickel Process is the subject of a booklet of unusual interest to all platers which has been prepared by The Harshaw Chemical Co., 1945 E. 97th St., Cleveland 6, Ohio. The 16 well-illustrated pages of the booklet cover the subjects of products, formulas, economies, and Harshaw services.

Copy of the booklet is available free to individuals addressing requests on their company letterheads.

Cambridge Wire Cloth and Metallic Screen. The Cambridge Wire Cloth Co., Cambridge, Md., has released a 32-page stock list of wire cloth and metallic screen. Included are items of steel, galvanized, brass, bronze, copper, Everdur, Inconel, Monel Metal, Nichrome, nickel and various stainless steel analyses for use in spraying, annealing, pickling, and various other operations. Copy of Stock List No. 600.

"A 'Hoist' of New Ideas" is the title of a circular prepared by Almco Inc., 233 E. Clark St., Albert Lea, Minn., which describes and illustrates its universal hoist for factory, warehouse, loading platform, and garage use. Copy free upon request.

"Ucilon," a protective synthetic coating developed from improved, inert, synthetic resins and especially advantageous for maintenance work and for products subjected to corrosive service, is the subject of a four-page descriptive folder now being issued by United Chromium, Inc., 51 E. 42nd St., New York 17, N. Y. The folder provides information on properties, application, and typical uses of the coating. Copy free upon request.

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"Rectrol" Electroplaters' D. C. Power Supply which is said to be ideal for small plating shops, manufacturing jewelers, and so on, is fully described as to features, operation, and available models in an illustrated leaflet prepared by the Electro-Tech Equipment Co., 119 Lafayette St., New York 13, N. Y. Copy free upon request.

"Bitumastic" Visual Index. A four-page visual index showing industrial applications for the different types of "Bitumastic" protective coatings manufactured by the Wailes Dove-Hermiston Corp., Westfield, N. J., has been published by this firm. The center page of the index contains a large composite drawing showing where Bitumastic and Bituplastic products can be used to advantage in the prevention of corrosion. The guide provides a handy checking arrangement whereby plant managers can readily determine the correct coating to use to protect their buildings and plant equipment. Copy free upon request.

Galvanizing Handbook. By John R. Daesen. Published by Reinhold Publishing Corp., 330 W. 42nd St., New York 18, N. Y. 166 pages. 78 illustrations. Cloth binding, board covers. Price, $5.25.

This handbook presents graphically the basic principles involved in galvanizing and demonstrates with photographic examples the nature and cause of many defects encountered in applying zinc coatings to iron and steel in a varied field. Many of the examples shown were articles that had been deliberately spoiled to indicate in an extreme manner conditions which are difficult to illustrate in the degree usually encountered in practice.

In addition to a forward and introduction, the book includes 12 chapters which are headed as follows: Mechanism of Protective Action; Typical Structure of a Zinc Coating; Variations in the Iron or Steel Base; Fluidity Control with Temperature; Fluidity Control with Aluminum Addition; "Spangled" Coatings with Eutectic Additions; Changes in Coating After Dipping; Heat Treatment of the Coating; Cleaning and Pickling; Fluxing; The Kettle and Its By-Products; and Hot Dip Coatings with Other Metals.

At the rear of the book are six appendices having the following headings: Testing Zinc Coatings; Preparation of

Sections for Photomicrography; Density and Strength of Acid Solutions; A.S.T.M. Standard Specifications for Slab Zinc (Spelter) B6-37; A.S.T.M. Standard Specifications for Zinc-Coated Steel and Iron Articles; and Bibliography: Hot Tinning. A complete index rounds out the book.

"Resin Baking Coatings by Induction Heating," an article by Robert J. Moore, technical coordinator of the Bakelite Corporation, is the subject of a 24-page booklet published by the Bakelite Corp., 30 E. 42nd St., New York 17, N. Y. The contents of the booklet are divided into six principal parts as follows: (1) Introduction: What are resin baking finishes? (2) Their properties and uses prior to the war; (3) Wartime uses; (4) What is induction heating? (5) Enlarging potential coating business: The application of continuous induction heating to pipe line coatings and to other expanding fields of use; and (6) Addenda: Wartime specifications for resin baking finishes.

Copy of the booklet is available free of charge to mechanical executives addressing requests on their company letterheads.

"M.S.A. Eye Protection for Every Application" is the title of a colorful eight-page bulletin published by the Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8, Pa. Eye-protective devices covered include chippers' goggles equipped with M.S.A. protective lenses; chemical goggles for protection against dangerous chemical particles and splashes; open frame Ful-Vue spectacles; spectacles with side screens and leather side shields; dust goggles; Dreadnaut goggles designed for protection against flying particles from any direction; welders' goggles with a wide choice of lens types; foundry and melters' goggles; acetate spectacles; gas goggles; wire screen goggles; and specially designed goggles for workers who must also wear corrective glasses.

The bulletin also features the M.S.A. Speedframe, a goggle mounting which is said to eliminate troublesome hand adjustment; M.S.A. Fogpruf for the efficient cleaning of lenses; and the M.S.A. goggle cleaning cabinet which contains Fogpruf and optical wiping tissues in a convenient wall mounting. Copy of Bulletin No. CE-29 free upon request.

"The What, When, Why, and How of 'Cocoon' Protective Packaging" is the title of a 12-page booklet prepared by the Coatings Division, R. M. Hollingshead Corp., Camden, N. J., which fully covers a unique packaging plastic consisting of modified film-forming vinyl resins carried in volatile solvents for protecting metal items, ranging from ball bearings to locomotives, from the elements. Copy is available free by requesting Form No. 5559.

EP High-Current Low-Voltage Motor-Generators are the subject of a four-page bulletin published by The Electric Products Co., 1726 Clarkstone Rd., Cleveland 12, Ohio. The bulletin illustrates and briefly describes electrolytic motor-generators for any electrolytic process; battery-charging motor-generators for any motive-power application; and diverter-pole motor-generators for the floating charge of standby batteries. In addition, the bulletin treats of frequency changers, industrial dynamometers, special motors and generators, and synchronous motors and generators. Copy of Bulletin 208 free upon request.

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